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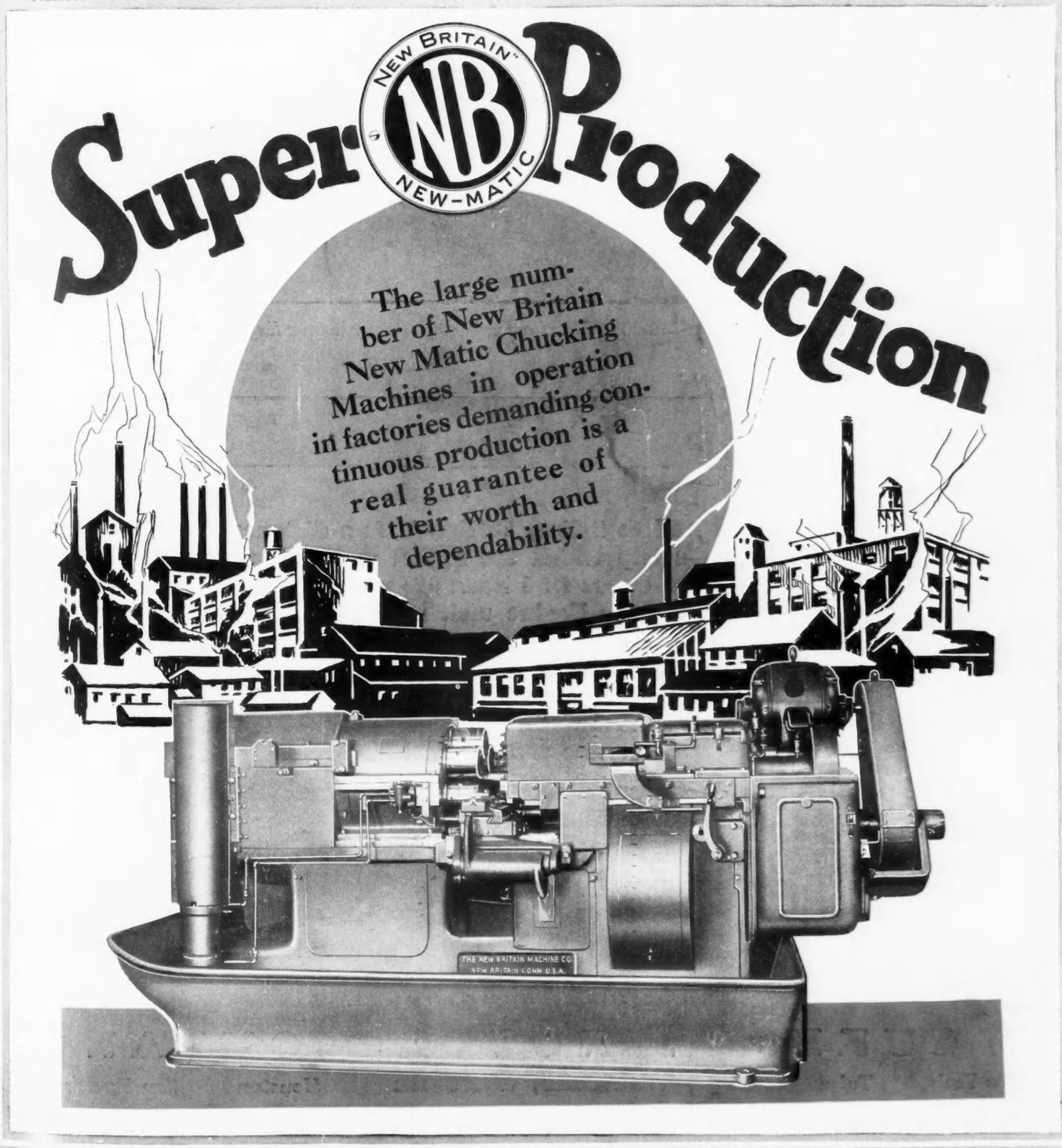
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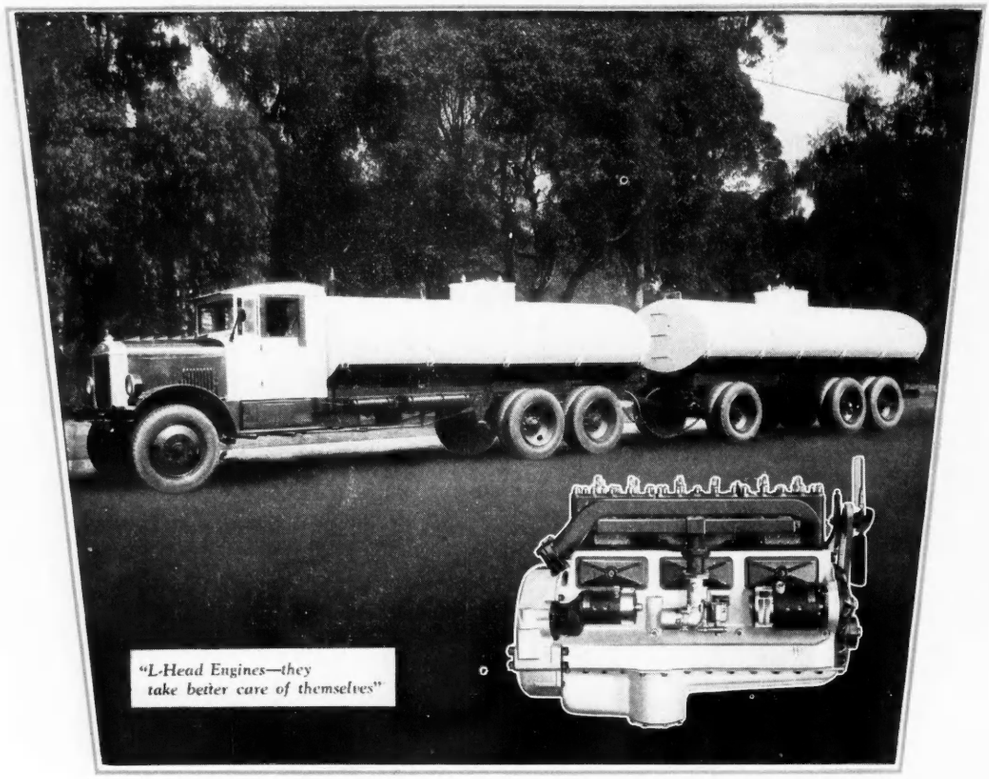

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Vol. 60 No. 7

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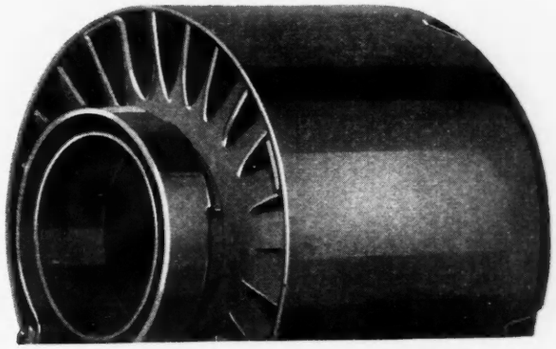
The Public Demands



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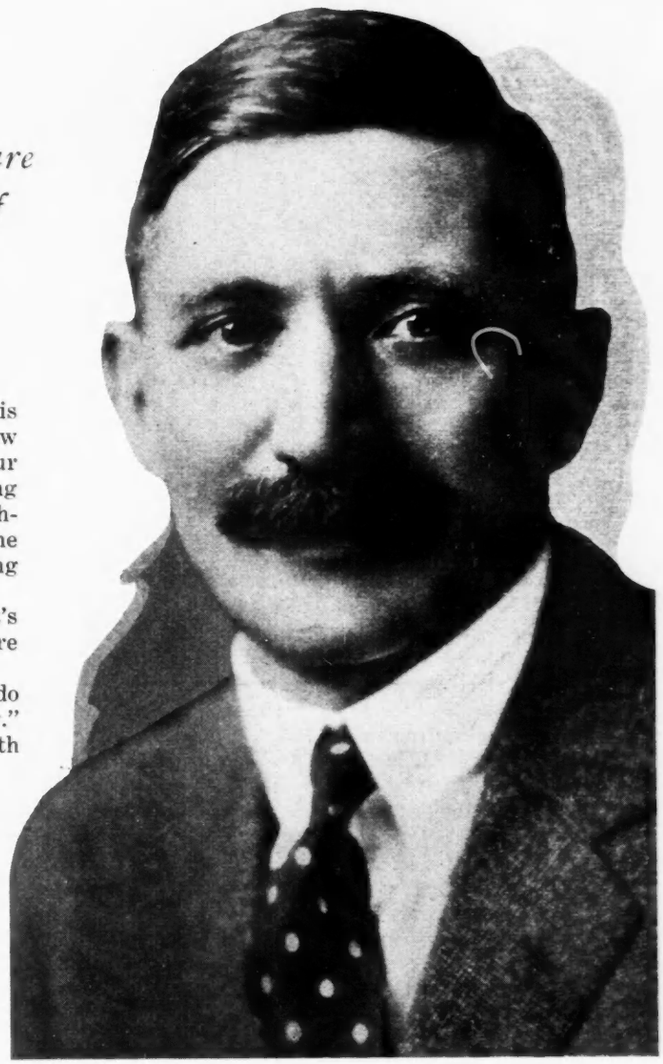
AUTOMOTIVE INDUSTRIES
VOLUME 60 *Philadelphia, Saturday, February 16, 1929* NUMBER 7

Less Waste Main Problem Now, Says Knudsen

Principal Production Economies of Future Coming from Better Conservation of Labor and Materials, He Thinks.

By Norman G. Shidle



William S. Knudsen

OUR big problem as automobile manufacturers is to learn more about the things we don't know how to do well, and to help every man in our organization to learn also. Our industry is executing pretty well all of the principles it understands thoroughly; the routine in that respect is all right. It's the things we don't know enough about that are going wrong.

"Everybody can recall the Ten Commandments; it's the nine hundred and ninety-nine variations that are so hard to remember.

"Almost every man in an organization tries to do right; trouble is that some of them just don't know."

These were a few of the comments which came with characteristic casualness from William S. Knudsen, president, Chevrolet Motor Co., during an informal conversation about automotive production and economic trends the other day.

"Keeping a group of satisfied employees," he went on, "is of primary importance, of course, from a production standpoint. Poor workmanship is a direct result of dissatisfied employees or insufficient direction. And, it seems to me, the executive has a better chance of properly judging the actions of his men correctly if he proceeds on the theory that lack of knowledge rather than lack of desire to do right is at the bottom of most mistakes. This holds true, I believe, even when that lack of knowledge leads to temporary difficulties.

"I remember an experience I had 10 or 15 years ago when I was in charge of production for a big company. I noticed one day that the time charges in the paint department were coming through very much lower than usual. Investigation showed that the foreman of this department was mixing together the first two of the three coats of paint which were applied and applying the mixture as a single coat, thus cutting down the time of the painting operation considerably. The fact that the same result wasn't obtained as by applying the two coats separately apparently hadn't occurred to him; he was trying to save time. Here was a typical case of a man who was trying to do right, but just lacked knowledge.

"Sometimes quite constructive developments come out of lack of knowledge, as a matter of fact. I used to find it very hard, for example, to get my finger on what the real difficulties were in the paint shop. When the job wasn't right in the old days, it always seemed to be the air, the paint or the brush that was wrong; nothing ever seemed to be the matter with the painter

himself. One day the foreman got to thinking about it and finally said, "Let's go get a sprinkling can and sprinkle the paint on. . . . That was the beginning of the flow-painting idea.

"Production economies in the future? The most important reductions in automotive production costs from now on are going to come from wasting less material. New and improved machine tool methods undoubtedly will be evolved, to be sure, and continued advances in material-handling equipment and practices are to be expected, but the big thing is reduction of waste.

"Figure it out for yourself," Mr. Knudsen continued.

"Suppose that the average passenger car weight is, roughly, something like 2400 lb. Suppose the industry builds 3,500,000 cars. If we waste only 5 per cent, the enormous volume of waste in dollars and cents is apparent; figuring scrap value 10 cents a pound the total waste would be somewhere in the neighborhood of $42,000,000 a year. Certainly there is a good field for attempts at cost reduction.

Mr. Knudsen standing beside the 3,000,000th car turned out by Chevrolet Motor Co., of which he is president. At the wheel is C. F. Barth, vice-president of Chevrolet

As he went on to talk further about elimination of waste, Mr. Knudsen didn't seem at all critical of present methods; merely interested in the possibilities of future improvements along this line. "You see," he said, "it isn't only the actual material that you waste that costs money. Frequently, a good bit of costly labor is expended on a piece before some mistake is made or discovered which renders the piece worthless. That is another phase of the matter which has to be watched very closely.

"Every year, as a matter of fact, we are getting to need closer and better inspection all along the line. But really good workmanship isn't so hard to get once you get men into the habit of working carefully. It's really easier to work to 0.001 in. than to 0.005 in. tolerances. Probably that doesn't sound right; but it's true, once you get into the habit of doing it. What it means is more attention and more care as a habitual thing; and that kind of a habit can be developed just as well as sloppy habits. . . . When I started in we used to work to 1/64 in.—think of it!

"Our company and its production department," he went on, "have to take care of four factors all the time —the stockholders, the employees, the dealers and the public. If we don't do our job properly we might stall off the stockholders for a while—but not for long; sooner or later they would be dissatisfied. We might get along with dissatisfied dealers for a little bit, but any such condition soon would make everything back up on us at the factory; they would stop selling cars and then where would we be. The public, of course, has to be satisfied if we are to go ahead permanently in business.

"The employees must be kept satisfied or we will get poor workmanship and get into all kinds of manufacturing difficulties.

"Practical and yet fair buying practices constitute another highly important element in the proper handling of manufacturing operations today. Our engineering department controls the buying of all materials which go into the car; they give their specifications to the purchasing department and that department buys to those specifications.

"As regards plant equipment, however, the works managers at each of Chevrolet's factories are responsible for the selection and purchase of the equipment which goes into their plants. The actual purchase order, of course, is signed by the purchasing department. The responsibility of the works managers in this regard is important, however, as we have obtained whatever degree of flexibility in production that we have achieved through delegating responsibility to various men down the line in all of our production operations."

Mr. Knudsen's 24 years of practical manufacturing experience in the United States, first as a worker on the bench and later in executive capacities, prior to becoming president of Chevrolet in 1924, equip him to evaluate the relative importance of various phases of the automotive production problem in an accurate and practical way rivaled by few heads of automobile companies.

His general background is now so well known to automotive men as to need little emphasis today. How he came to this country at the age of 19, after finishing at the Government Technical School in his native city of Copenhagen; how he worked with the Gas Engine & Power Co. in New York as a riveter, with the Erie Railroad as a boiler maker and with the John R. Keim Mills first as bench hand and finally, 12 years later, as a factory manager; how he became associated with the Ford organization in 1913 after the Keim mills had been merged with Ford and how he finally assumed charge of production at Ford's Highland Park plant; and how he became associated with General Motors Corp. in 1922, shortly becoming vice-president in charge of operations for Chevrolet, and on Jan. 5, 1924, taking office as president of that company—all of these facts are too well known by far to need repeating to any automotive audience.

They do, however, form the background from which has arisen a condition where Mr. Knudsen's ideas on automotive production practices have come to have more and more interest for manufacturing executives and where his thoughts are coming to be sought more widely every year.

New British Bus Has *Six-Cylinder Overhead*-Camshaft Engine

Designed for forward driving with all accessories grouped on opposite side. Expanding helical timing gears and combined fan and camshaft drive among features.

By M. W. Bourdon

THE Associated Equipment Co., maker of 90 per cent of London's buses, has introduced an entirely new bus and coach chassis for 30-35 seated bodies; it has numerous features of design which make it distinctive and of more than usual interest.

The new chassis is arranged for a forward position for the driver, the steering and controls being alongside the engine on the right to accord with the British rule of the road. To prevent the accessibility of engine auxiliaries being reduced on that account, they are all located on the left, the water pump in front of the timing gear casing and the generator and magneto behind it being in line, with the carburetor above the flexible coupling between the two electrical units. The oil filler, oil dip-rod and spark plugs are also on this side.

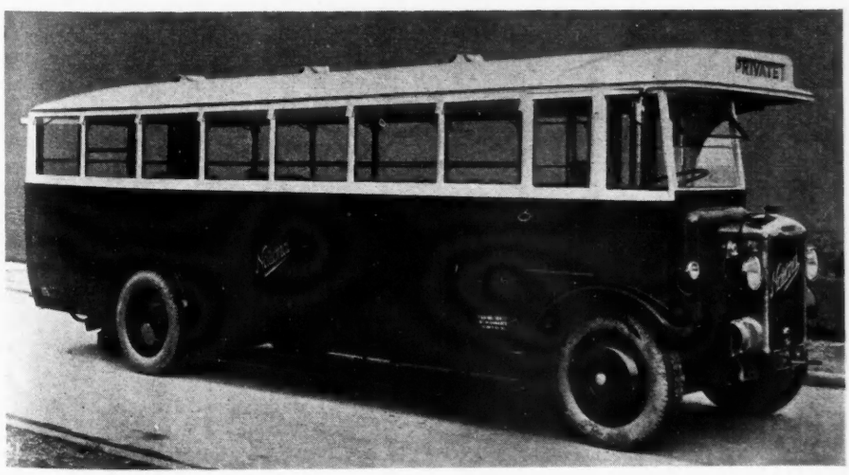
The six-cylinder engine, designed by C. J. Rackham, late of Leyland Motors Co., one of Britain's foremost bus and truck makers, is suspended at three points in the main frame, by means of compression springs and vertical bolts passing through a bridge forging and integral arms of the aluminum crankcase at the rear, and on a rubber buffer at the front. With a bore and stroke of approximately 3 15/16 by 5⅛ in. giving it a piston displacement of 374 cu. in., the maximum power, viz., 95 b.hp., is developed with standard carburetor settings at 2500 r.p.m.; at 1000 r.p.m. the output is 48 b.hp., the curve running thence in a straight line up to 88 b.hp. at 2000 r.p.m. The maximum designed speed is 3000 r.p.m. With special settings 102 b.hp. has been developed and maintained for 100 hours continuously.

The unit is compact, the overall length from the front of the fan and the back of the cylinder block being only 45 in., while with generator, flywheel, bridge forging for rear suspension and all auxiliaries it weighs barely over 1000 lb. or about 10 lb. per horsepower. The compression ratio is 5 to 1. Only the actual cylinder block and detachable head are of cast-iron, the upper and lower halves of the crankcase, the upward extension of the timing case and the cylinder head cover all being of aluminum.

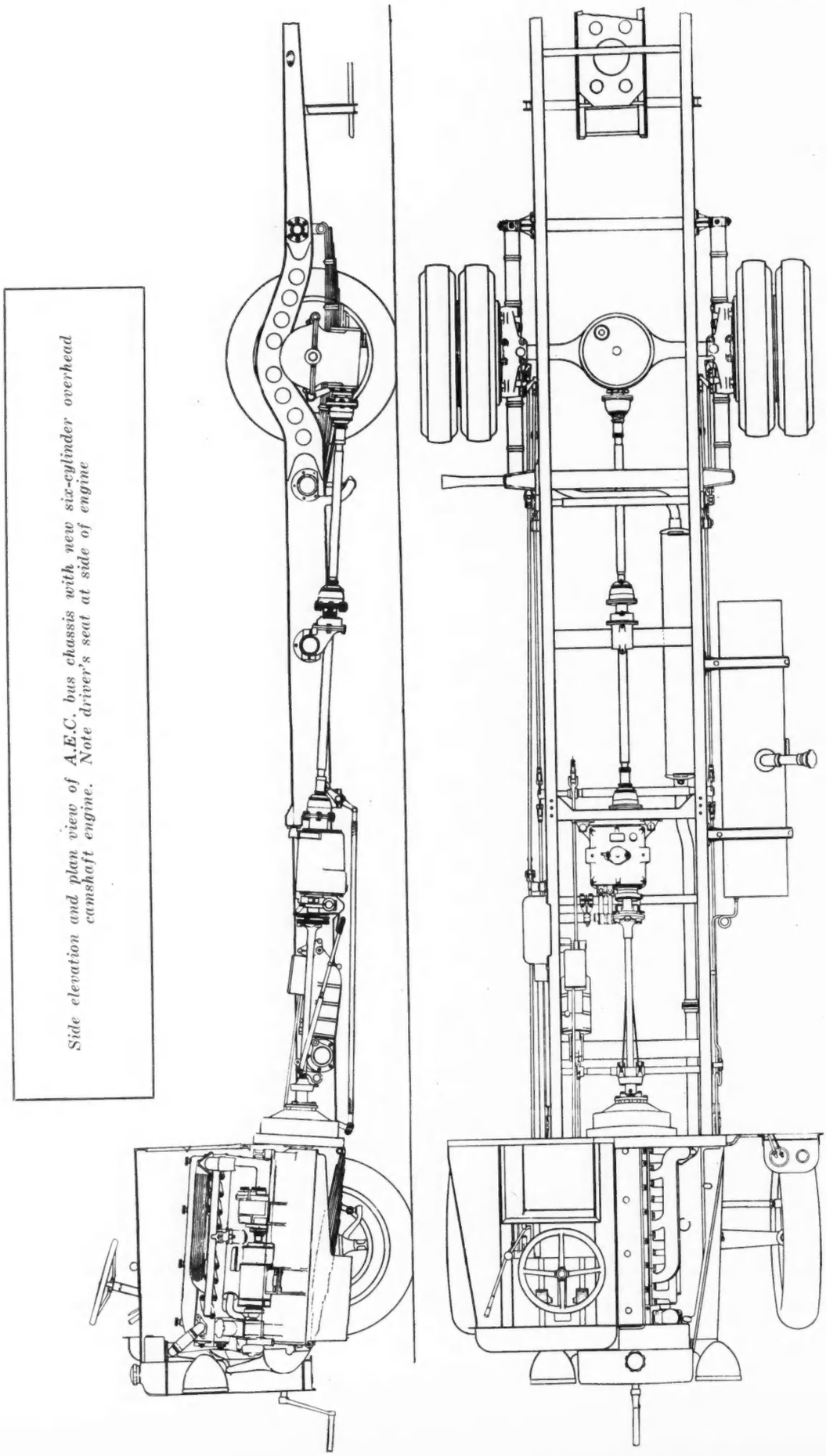
Overhead Camshaft

Valve operation is by means of an overhead camshaft running in a trough of oil and driven by a duplex roller chain and a pair of helical gears, the latter affording the two-to-one ratio. A point of note here is that the lower and smaller of the pair of helical gears is split circumferentially, the halves tending to separate under the pressure of two light compression springs located within recesses in the front half of the gear; the object of this scheme is to take up blacklash due to wear and so to encourage maintained silent running. The shaft carrying this gear wheel and the driven chain sprocket runs on ball bearings and is continued forward to constitute the fan shaft, on which the fan is loosely mounted, driven by a light friction clutch. To permit the small axial movement of the rear half of the helical gear, this section is free to slide on a feather key which extends forward from the boss of the chain sprocket and is sunk into a rearward sleeve extension of the boss of the front half of the gear. Chain adjustment is automatically maintained by an eccentrically-mounted spring-loaded idler sprocket.

Rockers transmit motion from cams to valves; the camshaft is much below the top ends of the valve stems, necessitating an inverted L-shaped rocker, with a set-screw and pinch-bolt for clearance adjustment. The split-cone type of valve spring anchorage is used, with two concentric springs for each valve. Both inlet and exhaust valves are of silico-chrome steel, but the ⅜-in. steel



New A.E.C. 30-35 passenger bus



Side elevation and plan view of A.E.C. bus chassis with new six-cylinder overhead camshaft engine. Note driver's seat at side of engine

of the exhausts are enlarged to 7/16 in. between guide and head. The mean diameter of the seat is 1⅝ in.

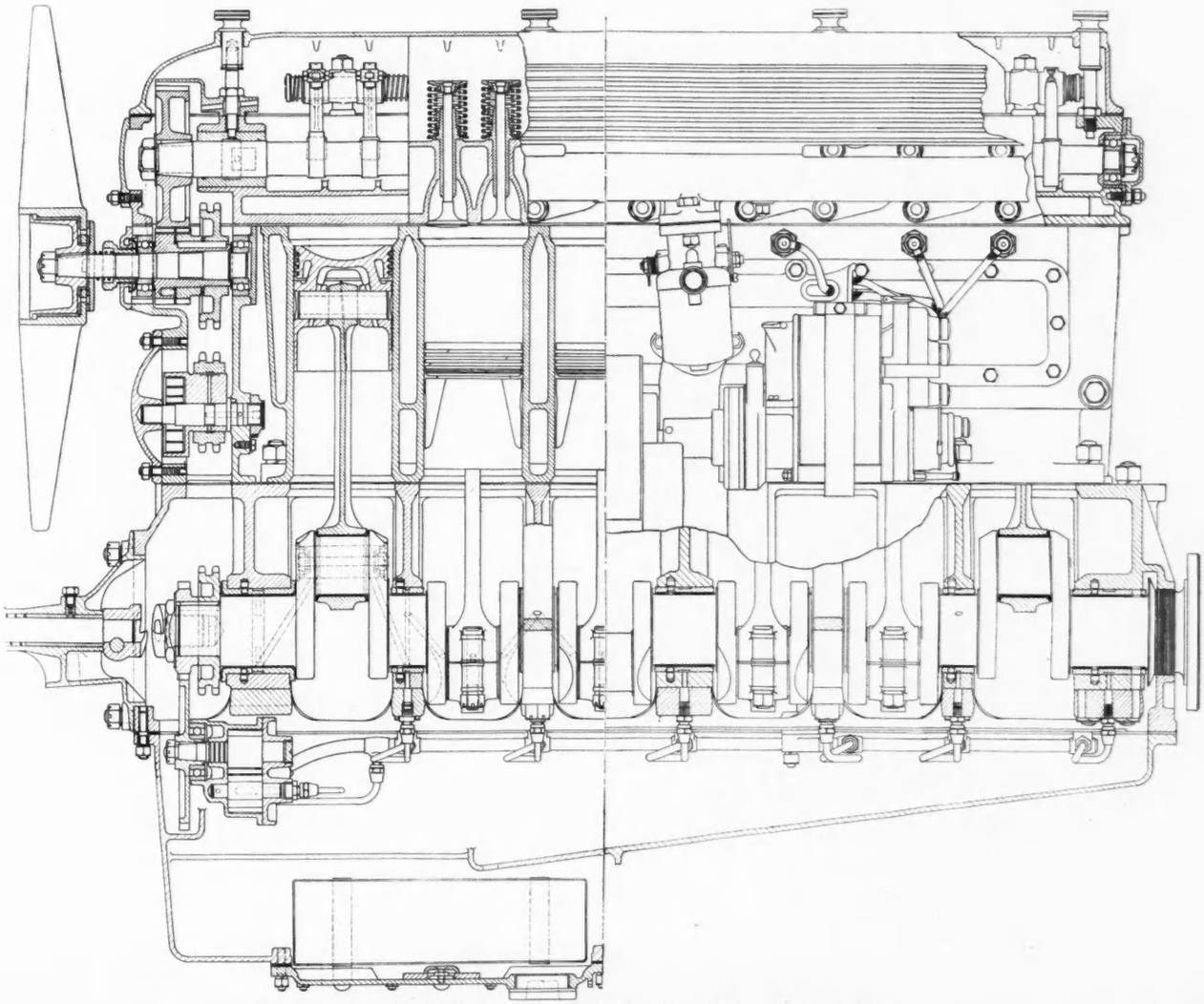
The seven-bearing crankshaft has journals of 2¾ in. diameter, and the pins, of 2¼ in. diameter, are bored out eccentrically to reduce the weight of the rotating mass, the ends of each of the bored holes being closed by pressed steel caps retained by bolt. End thrust is taken on the front bearing, so that the alignment of the front end drive sprockets will not be affected by the difference in expansion between the steel crankshaft and the aluminum crankcase.

Aluminum Pistons Used

The bearing lengths are: Front and rear, 3 in.; center, 2⅜ in.; intermediate, 1⅛ in., and big ends, 2⅛ in. The bearing caps are secured by the holding-down bolts of the cast-iron cylinder block, these passing down through the webs of the upper half of the crankcase. Steel connecting rods of H section are used with the hollow piston pin secured in the small end by a clamping screw; the piston pins are 1 1/16 in. in diameter. B.H.B. split skirt aluminum pistons are used.

Two of the cylinder head holding-down nuts have a flange fitting and when being unscrewed they automatically lift the head from the block, so breaking the joint without necessitating the use of wedges, etc. Hooks are provided in the head so that it can be raised by lifting tackle slung from the roof of the driver's cab; this tackle is provided in the tool-kit. To assist in retiming the engine when the cylinder head and camshaft are being refitted, a spring-loaded plunger is provided to lock the timing gear, and another to hold the flywheel in its appropriate position.

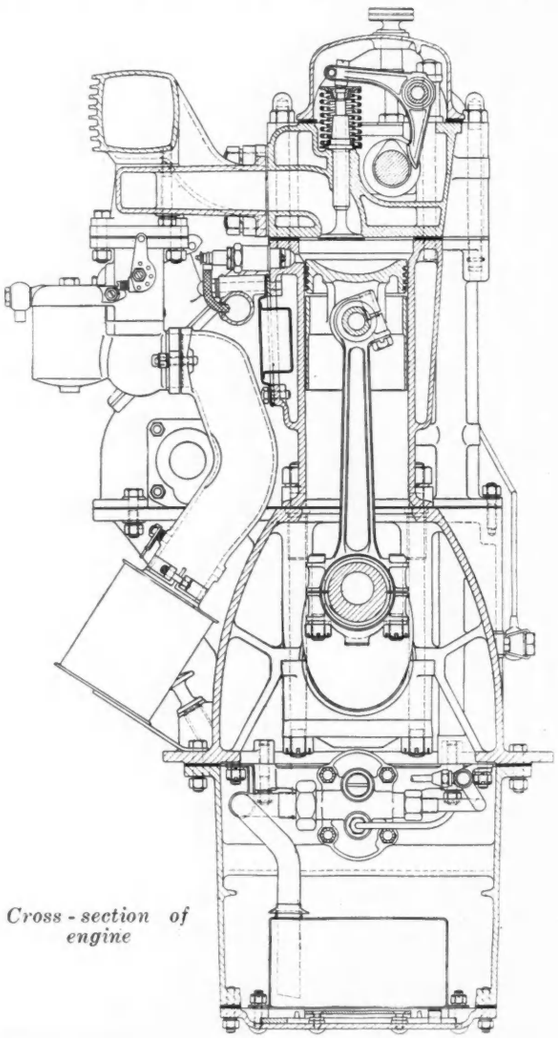
The centrifugal water pump has points of note. Although fitted in front of the timing case, it can be readily removed without disturbing the radiator. It is held in place by two nuts and is driven by a dog clutch, hence needs to be drawn forward only ½ in. to come away clear. The rotor spindle runs in a white-metal bushing with a spiral groove so arranged that, when running, water is induced to the rear end of the bush and then returns by a straight groove below the bushing in the pump housing. The water is thus circulated continuously through the bearing and acts as a lubricant. Behind the bush is a graphite ring with a coned seat bearing upon the similarly coned end of the spindle, the two being lapped together prior to assembly; a thrust spring, within the spindle of the driving dog, presses the pump spindle against the graphite ring, this arrangement serving effectively as a gland to prevent water leakage into the timing case. The pump runs at one and a half times engine speed, as does the generator.



Longitudinal section through six-cylinder bus engine

A peculiar drive is provided for the gear-type oil pump for the pressure lubrication system. The pump lies immediately below the front bearing of the crankshaft, with its gear shafts horizontal and in the same plane as the crankshaft; it is driven at half engine speed by a pair of pinions, one of which is formed as a unit with the driving sprocket of the chain distribution mounted on the nose of the crankshaft. To obviate bearing wear due to the thrust from the driving pinions, a ball bearing is used for the front end of the primary gear shaft of the pump.

A novel feature lies in the provision for oil delivery to the overhead camshaft and timing chain. In the lower or idler gear of the pump is a ⅛ in. radial hole between two of the teeth; at each revolution of the gear this hole, when it reaches the pressure side of the pump casing, registers with an axial hole in its fixed spindle. Each time this occurs, a squirt of oil is taken to a gallery in the front of the upper part of the engine, whence half this auxiliary oil



Cross-section of engine

feed goes to the camshaft trough and half to the timing chain. The sump holds four Imperial gallons of oil and has a 13 by 11 in. detachable plate underneath which carries a very large gauze filter (12 in. long, 7 in. wide and 3 in. deep) into which depends the 1-in. diameter suction pipe from the pump. Below the gauze filter, in a shallow sump, are two horseshoe magnets intended to collect ferrous particles that settle from the lubricant.

Oil pressure varies between 5 lb. at idling speed and 60-80 lb. in normal running, for the by-pass valve is coupled to the throttle. A long vertical spindle projects upward from the valve and out of the right-hand side of the crankcase, where there is a lever connected with the throttle control; a set-screw projecting from the lever presses upon or releases the spindle against the action of the by-pass spring, and affords means of adjustment for the effective oil pressure.

The carburetor is a vertical-type Solex feeding to the center of an aluminum manifold of rectangular section. Above the carburetor flange, with no intervening riser beyond that formed by the carburetor throat and flange, is an impact hot-spot 9 in. in length and 2½ in. wide, making contact with a facing on the ribbed exhaust manifold. There is no preheating for the air beyond that natural to the temperature prevailing under the hood. An AC air cleaner is standard equipment.

Engine Easy to Remove

Ease of removal of the engine from the chassis is notable, for the oil sump of the crankcase is in front of the front axle, while the front cross-member of the frame is detachable to enable the engine to be drawn forward.

It is of note that a cone clutch has been adopted for this new chassis; it is of the inverted type with asbestos friction fabric and a single spring. From the clutch to the separate four-speed gearset the drive is taken through a shaft with sliding and fabric disk joints. The gearbox is three-point suspended and carries a clutch brake. All gears are ground, of case-hardened nickel-chrome steel, and are fitted on splined shafts.

Between gearset and rear axle is a divided and open propeller shaft, with metal universals, leading to the under-mounted worm final drive. Engine, gearset, propeller shaft and worm shaft are inclined to give a straight-line drive throughout with full load. A one-piece, nickel-steel forging forms the rear axle casing, in which parallel roller bearings are used for the worm shaft, with ball thrusts. Taper roller bearings are used for the wheels, and a bevel type differential. The separate case carrying worm gear and differential assembly is unusually large, having an oil capacity of approximately three Imperial gallons. Two worm drive ratios have been standardized, the lower one for bus work and the higher for touring coaches.

The following are the gear ratios and the road speeds at an engine speed of 2000 r.p.m.:

		Rear axle ratio 6.25 to 1	Rear axle ratio 5.20 to 1
1st speed	5.06 to 1	6.83 m.p.h.	8.2 m.p.h.
2nd "	2.97 to 1	11.62 "	13.95 "
3rd "	1.70 to 1	20.3 "	24.4 "
4th "	Direct	34.6 "	41.6 "
Reverse	6.32 to 1	5.48 "	6.6 "

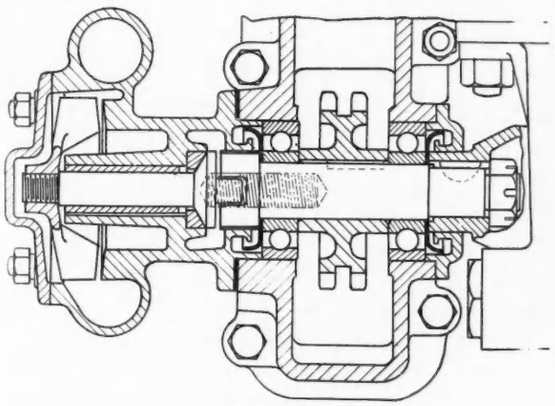
The maximum gradient which the bus can climb on first speed is 25 per cent.

The four-wheel brakes are pedal-operated through a Dewandre vacuum servo, without any form of compensation; the hand lever actuates smaller separate sets of rear wheel shoes. All brakes are of the expanding type, with detachable liners and pressed steels drums. The brake shoes sizes are: Pedal-operated front, 17 x 3 in.; pedal-operated rear, 22 x 3 in.; hand-operated rear, 13¼ x 2⅞ in. The same leverage ratio is provided for the front and rear pedal-operated shoes. All brake rods consist of oval

tubes to secure greater rigidity in the vertical plane. Steering is by Marles cam gear. Underslung springs 56 in. long and 3¼ in. wide are fitted at the rear, with hydraulic shock absorbers. Below the center of each rear spring proper are three stiff leaves ranging from 16 to 22 in. in length which come into action only when the load is near the maximum and tend to shorten the effective length of the main spring and prevent undue deflection with full load. The front springs, which are 42 in. long and 2½ in. wide, are considerably inclined, being between 7 and 8 in. farther from the ground in front than at the back.

For the fuel feed an Autovac draws from the 40 gal. main tank, suspended from the left-hand side-rail of the frame, and is located in a four-gallon tank on the dashboard; from this auxiliary tank the feed is by gravity, with a two-way cock normally retaining three gallons in reserve. In the event of the Autovac failing, the auxiliary tank can be replenished by hand temporarily and on successive occasions until the main tank can be brought into use again.

The tubular radiator is mounted on rubber blocks on the front cross-member of the frame; thermostatic control is provided for the water circulation. De-



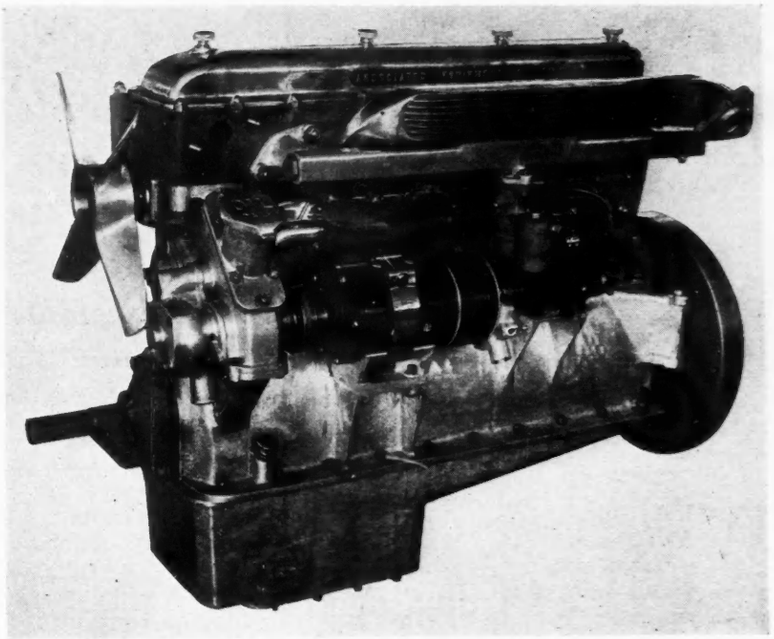
Water pump and drive

tachable steel disk wheels are standard, with 38 x 8¼ in. low-pressure tires; an option is given on 38 x [illegible] in. high-pressure tires.

An unusual procedure has been adopted for trying-out the first small batch of experimental chassis of this new A.E.C. Instead of subjecting the chassis to road trials in the hands of testers only, who might be inclined to "nurse" it, 32-seated bus bodies were fitted and the vehicles were handed over to several of the largest bus operating companies in London and the Provinces to be tried out under actual service conditions in the hands of ordinary drivers and mechanics. It is stated that the data obtained have been of immense value to the makers, and that, as a result of the performance of the experimental vehicles, the companies which tested them and others have already placed orders for the production model, the chassis price of which is £1,100.

Following are some leading particulars:

Wheelbase	16 ft. 0 in.
Track	Front, 73 in.; rear. 70 in.
Overall length	25 ft. 9 in.
Overall width	7 ft. 4 in.
Body space (length)	21 ft. 2 in.
Turning circle	60 ft.
Minimum ground clearance	7½ in.
Height of frame, loaded	24¾ in.
Chassis weight	6830 lb.



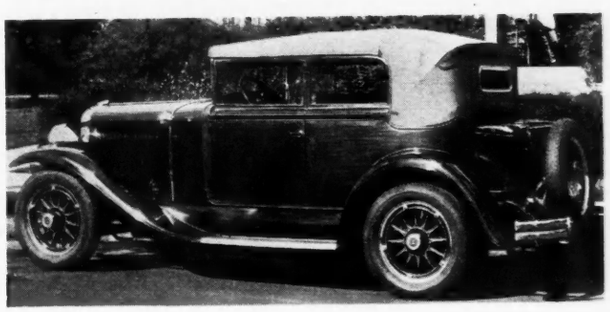
Side view of engine, all accessories mounted on this side

Griswold Semi-Convertible Body

A NEW type of body has been developed by the Griswold Motor Body Co., Detroit, Mich., in which the window frames are stationary and are built and assembled integral with the body, while the top folds back in the usual manner. Glasses raise and lower in the window frames and can be left up while the top is down.

Some of the advantages claimed for this new style of body are that there is no binding or rattling of windows since they ride in the same channel construction as they would in an ordinary sedan. There is also no chance for the top to sag or vibrate because it locks itself on the channels when up. The top is given a definite support when up, so it can be made considerably lighter than the usual convertible top and can be folded into a very small package.

In the illustration a body of this type is shown mounted on a Graham-Paige 615 chassis.



Griswold semi-convertible fabric body on Graham-Paige chassis

Foreign Engines *are* Prominent *at* N. Y. Aircraft Show

Four Isotta-Fraschini powerplants exhibited for first time in this country. Columbia's new engine also on display. Other developments introduced.

By Herbert Chase

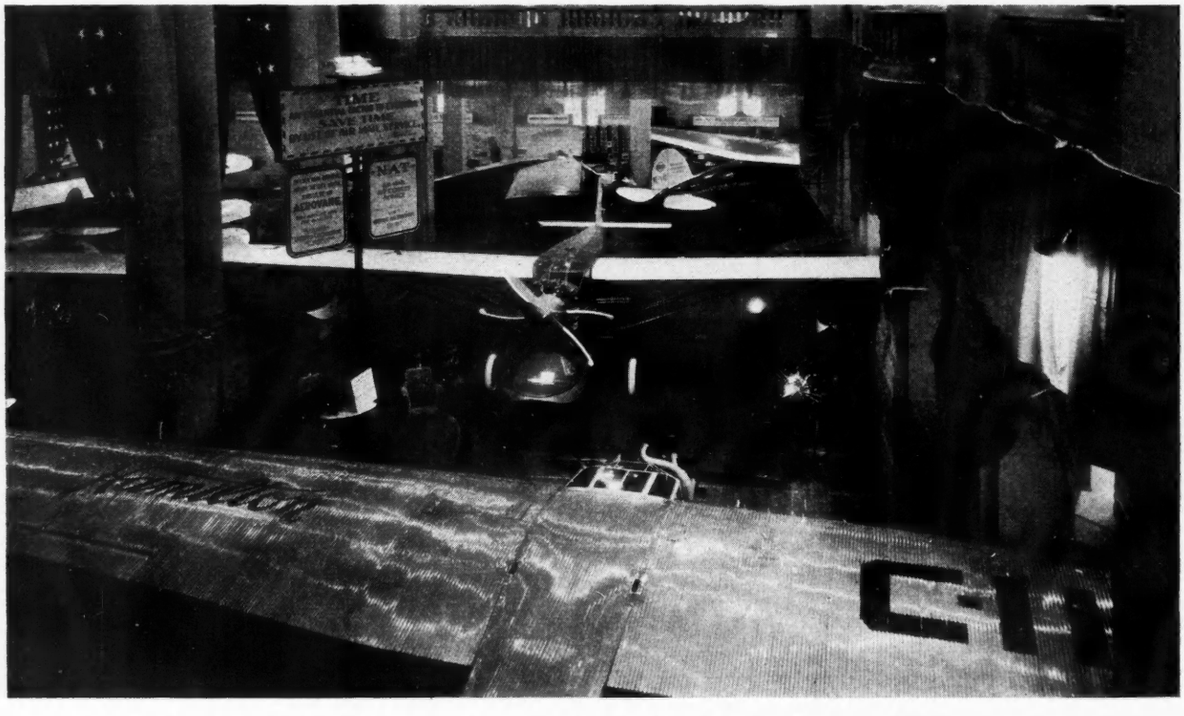
WHILE most of the exhibits at the New York Aviation Show were not new to those familiar with the rapidly expanding aircraft industry, novel features were not lacking. Newcomers are numerous in this field and it is rash to predict how important a place they will occupy in the industry a year or two hence.

One thing seems certain, however, and that is that foreign developments both in planes and power units are destined to provide interesting competition with products originating in this country. It has already been announced that American interests have purchased the rights to manufacture the Asso aircraft engines designed and built by Isotta-Fraschini in Italy, and another concern, the Wright-Tuttle Aircraft Motors Corp. of Anderson, Ind., has been licensed by the Renard Aviation & Motor Co. of Brussels, Belgium, to manufacture Renard designs in this country.

Four Asso engines and one of the Renard design had their first American showing at the New York exhibit. A still newer development, however, is Columbia's nine-cylinder radial engine of 5-in. bore and 3¾-in. stroke. The weight of this entirely new engine is given as 540 lb. and it is said to develop 280 hp. at 2600 r.p.m. The weight includes a built-in 2 to 1 reduction gear, lighting generator and battery ignition equipment, but not the battery.

The engine is claimed to have 10 per cent less frontal area than other radial engines of equal power. Cylinders are of steel, fitted with aluminum heads which are held on by a "positive lock" or screw, details of which are not given. Valve rocker arms are inclosed in streamlined cases, while the pushrods are inclosed in tubes. The valve gear and distributor heads are located forward of the cylinders, while a supercharger is placed to the rear, between cylinders and accessories. The maximum diameter of the engine over the outside of the rocker arm casings is 41½ in.

This engine was designed and built in Europe espe-



General view of a part of the main floor exhibit at the Aviation Show held in New York. The amphibian monoplane in the center is the new Columbia Triad

cially for Columbia Air Liners and is made to metric standards, but will be produced here in inch dimensions. The stroke has been made short to permit of high speeds and to reduce the outside diameter. The reduction gear and centrifugal supercharger are built-in units.

Another new engine, called the Dayton "Bear" and produced by the Dayton Airplane Engine Co., is being shown for the first time. This is a four-cylinder in line type, air-cooled, and is said to develop 110 hp. at 1550 r.p.m. Its weight is given as 375 lb.

National Aero Corp. of Perth Amboy, N. J., showed a new 100 hp. seven-cylinder radial in addition to its older four-cylinder in line engine. These engines are sold under the name Cameron. The four weighs 180 lb. and develops its rated power at 1800 r.p.m., while the radial weighs 280 lb. and develops its rated power at the same speed. Both engines have the same bore, 4.125 in., while the strokes are 4.5 in. for the radial and 4.75 for the four.

Four Isotta Engines

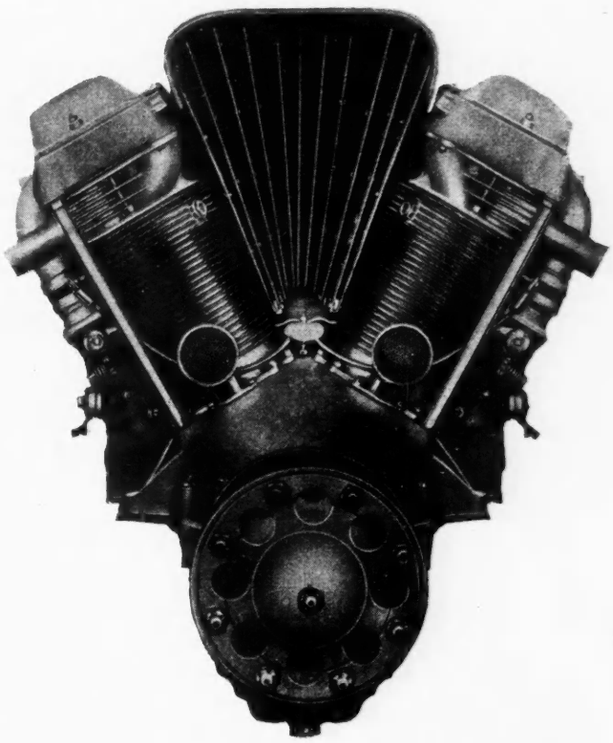
There were four engines in the American Aeronautical Co.'s exhibit of Isotta-Fraschini design and construction. All present the clean-cut design which is typical of this well-known Italian manufacturer. They indicate that Italy is keeping pace with the best in aircraft engine development, at least in engines with one, two and three banks of cylinders. The smallest of the four is called the Asso "80" and is an air-cooled job with its six-cylinders cast integral with the top half of the crankcase. The metal used is Elektron, a magnesium alloy weighing less than two-thirds as much as aluminum. The detachable heads are cast from the same metal. This engine weighs 242 lb., and has a 5.5 compression ratio, 95 mm. bore and 140 mm. stroke. It develops 80 hp. at 1400 r.p.m.

The other Asso six exhibited is the "200." It is water-cooled, 140 by 160 mm. and develops 240 hp. at 1600 r.p.m. The compression ratio is 5.7 and the weight 616 lb. This engine has steel cylinders with welded jackets and the heads for all six cylinders form a single aluminum casting carrying the overhead valves and valve gears.

Next in size is the 12-cylinder V-type air-cooled Asso with 5.3 compression ratio. This engine has two banks of cylinders of 125 mm. bore and 140 mm. stroke. The power at the normal speed of 2250 r.p.m. is 420 hp. Cylinders are of steel with integral cooling fins, while the heads are Elektron castings. A unique feature of this engine is the arrangement of ducts which are formed into a fan-shaped structure fitting into and filling the V. There is one duct for each cylinder, and it is so arranged that air from the propeller is forced into it and discharged around the cylinder which it serves. The weight of this engine is 704 lb.

What is said to be the largest aircraft engine ever imported into this country is the fourth in the Isotta-Fraschini group, namely, the 18-cylinder W-type which develops 1000 hp. at 1600 r.p.m. with direct drive and 1200 hp. at 1950 r.p.m. when geared. The dimensions of this engine are 150 by 180 mm. The geared job has a 5.7 compression ratio and weighs 2110 lb., while the direct drive has a 5.5 compression ratio and weighs 1725 lb. In general the construction resembles that of the six-cylinder water-cooled engine already described. Two engines of this type but differing somewhat in detail have been built for use in the Schneider-Cup-race seaplanes now under construction by the Macchi Company in Italy.

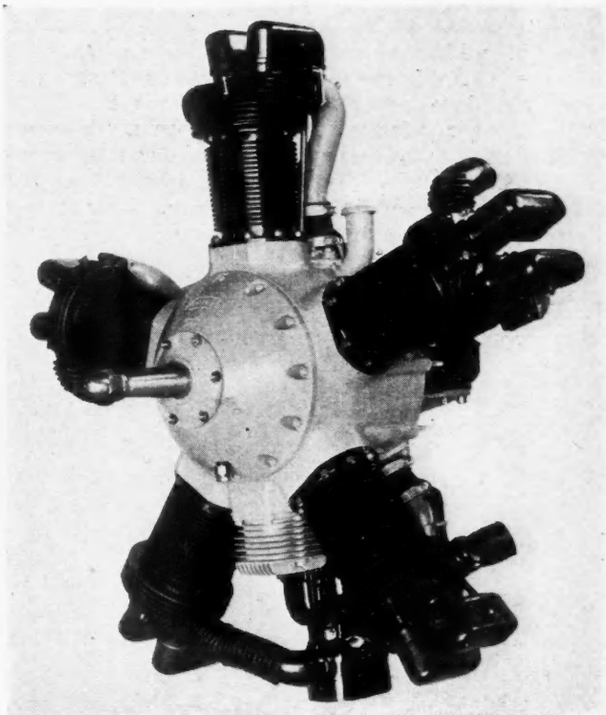
A few changes have been made in the Kinner five-



The 450 hp. 12-cylinder air-cooled Asso, one of the four Isotta-Fraschini engines exhibited for the first time in this country

cylinder radial engine since it was exhibited at Chicago. These include a Bohnalite head and crankcase, the latter with internal instead of external ribbing, and a new oil-cooler.

Only a few planes were exhibited, and three of



Five-cylinder Kinner engine which has been partly redesigned since the Chicago show. Bohnalite cylinder heads and crankcase are now employed

these developed by Columbia Air Liners, Inc., were the center of much interest. The largest of the three, named "Uncle Sam," is a high-winged monoplane with 64-ft. wing spread. It is fitted with a 600-hp. inverted Packard engine. Duralumin is used for the entire structure. Although the wing is said to be designed to be self-supporting, a pair of struts is added at each side for increased safety. Below the wing and partly above the axis of the engine is a cabin of graceful design which provides space for two pilots and a navigator. Below the cabin and between it and the landing gear is the radiator. The landing gear is described as a cantilever type. The cantilevers are pivoted at the strut joints and carry wheels at their outer ends with rubber shock absorbing members at their inner ends close to the central plane of the ship.

This plane is designed for a speed of 150 m.p.h. and is said to have a cruising radius of 6000 miles. At present it has seven fuel tanks in the wings and one in the fuselage, with a total capacity of 1250 gal. Six dump valves, three on each side of the cabin, enable the pilot to dump the entire load of fuel in about 50 seconds.

Five-Place Amphibian

The second of the new Columbia planes is a five-place amphibian, fitted with a Wright J-5 engine, the new Columbia engine being furnished as an optional power unit. This monoplane has a 49-ft. wing span. A pair of struts at each side support the wings. A large central pontoon is placed between the wheels of the landing gear. The wheels can be drawn in flush with the sides of the cabin, by the use of an hydraulic retracting device, when landing on water. This plane is easily converted into a strictly land type by removing the pontoons, or the wheels may be removed to convert the ship into a straight seaplane.

A single-place monoplane called the Baby Columbia is the third ship exhibited by the Columbia Air Liners. It has a 28½-ft. wing spread and is fitted with a 40-hp. Samson engine. It is said to be capable of making 110 m.p.h. and has a landing speed of 55 m.p.h.

Another entirely new plane to have its first showing is an eight-place monoplane by the Crescent Aircraft Corp. This plane is the design of Arthur L. Thurston and Walter Ludwig and was built under the supervision of Clarence D. Chamberlin, who holds the title of technical advisor to this company. Nearly the whole fuselage is of metal, its section being square, but the wings are largely of wood.

Since the Chicago show the Buhl Aircraft Co. has added a new model to its line of "Airsedans." This is a sesquiplane known as the Standard and has a 40-ft. wing span. It is fitted with the Wright "Whirlwind" J-6 engine and is capable of making 145 m.p.h. The landing speed is 45 m.p.h.

Travel Air showed one of the same planes exhibited in Chicago, except that the J-6 Wright engine has been substituted for the J-5 and landing lights are fitted on hinged covers so arranged that the lights can be tilted into a wing recess when the plane is in flight.

Most of the other planes and engines exhibited were either on view at the Chicago show or are well known to the industry. Since the New York show was not sanctioned by the Aeronautical Chamber of Commerce, most of that organization's member companies, including the most prominent concerns in the industry, did not have exhibits of their products.

Interplanetary Travel

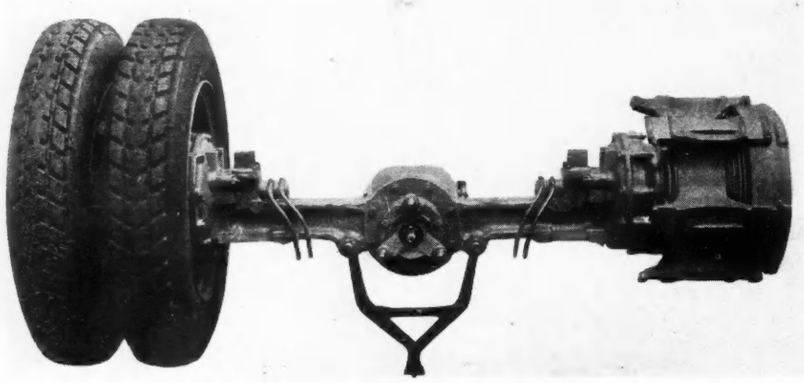
THE experiments with the Opel rocket automobile last summer, which were followed more recently by demonstrations with another similar machine built by Volkhardt, seem to have aroused in Germany considerable interest in the problem of interplanetary or space travel, and a book dealing with the general subject has appeared—Das Problem der Befahrung des Weltraums, der Raketen Motor, by Hermann Noordung, published by Richard Carl Schmidt & Co., Berlin.

After discussing seemingly possible methods of getting out of the gravitational field of the earth and of landing at safe speeds, the author remarks: "It has thus been shown that not only ascension into space but also assurance of a controlled return is within the realm of the technically possible, so that it seems in nowise justified to designate the problem of space travel in advance as utopian, as one would be inclined to do after a merely casual consideration and in accordance with tradition. There are no basic obstacles to cosmic travel, and even the technical and scientific premises so far established justify the expectation of an eventual realization of this most daring of all human dreams."

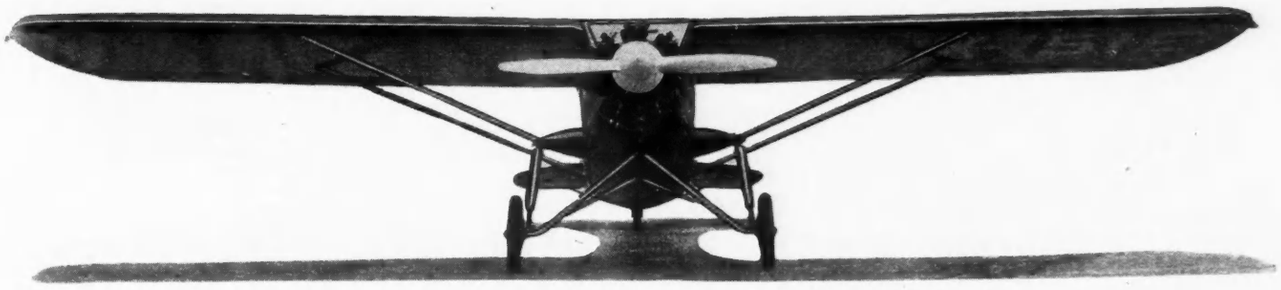
Brake Accessibility

IT is rather unfortunate that brakes arranged in the conventional way on the inside of the wheel are so inaccessible. The designers of the German M. A. N. bus have sought to eliminate this objectionable feature of conventional construction and place the brake on the outside of the wheel, as shown by the accompanying photograph. This is made possible by the use of a rear axle having a final reduction through spur gears on the inner side of the wheels.

The carrying member is of the I-beam section and is dropped between spring seats, and by drilling out the wheel spindles axially it is possible to pass brake-operating shafts through them and carry the brake drums on the outer side of the wheels. Each drum contains both a service and an emergency brake, and the two operating shafts are concentric with each other, each brake drum is provided with a cover and the brakes are more completely inclosed than when they are on the inside of the wheel.



M. A. N. bus rear axle with brake on outside of wheel



Front view of Verville Air Coach showing simplicity of wing bracing

Improved Visibility is Obtained in Verville "Air Coach"

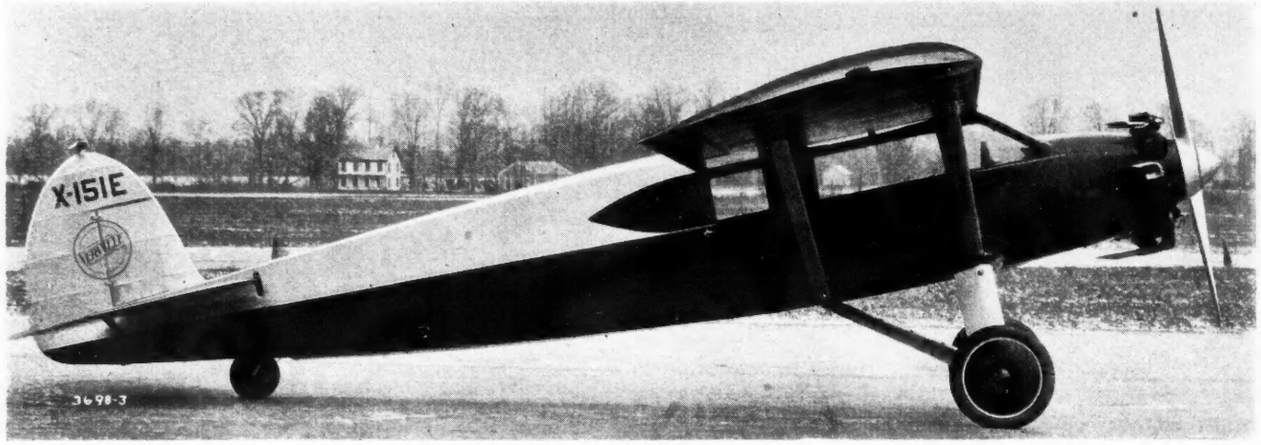
Fuselage structure eliminates intersection of truss tubes in plane of side windows. Designed to accommodate either Warner, Wright or Curtiss engine.

INCREASED visibility, due to an improved fuselage structure which eliminates the intersection of fuselage truss tubes in the plane of the side windows, is an outstanding feature of the Verville Air Coach, the first model of a line which the Verville Aircraft Co., Detroit, is planning to place on the market. A patent has been applied for on the system of fuselage trussing employed and details regarding it are promised for a later date.

Above — The cabin of the Air Coach resembles a modern automobile body in size, lines and appointment

Left—Close-up view of tail surfaces

Two short streamline sponsons, or stubs, semi-elliptical in plan and 16 in. in length, project horizontally from the lower longeron in the plane of the front spars. To these the forward wing brace struts and chassis struts are attached. By attaching the wing struts in this manner, parasite resistance is reduced, as compared with the conventional type of exposed strut bracing. The landing gear shock struts are attached at the end of the stubs, allowing a 7-ft. chassis wheel tread. The stubs, or fins, as they might be called, also serve as small compartments 8 in. deep, with hinge doors on top. The left compartment will be used for the lighting battery, and the right one for tools.



This side view emphasizes the clean lines of the Verville Air Coach

Other novel features of the Air Coach include a rudder streamlined into the fuselage, and a hand brake control permitting of applying the brake to either wheel alone or to both wheels together. A tail wheel equipped with full caster Aerol shocks and built into the fuselage is provided to decrease drag and for simplicity and sturdiness of construction.

The machine here illustrated, which is equipped with a 110 hp. seven-cylinder Warner engine, was test-flown at the Ford Airport by William S. Brock, who found that it had a maximum speed of 110 m.p.h. and a corresponding landing speed of 45 m.p.h. A detachable engine mounting is provided for in the design, and the latest Air Coaches will also accommodate the following engines, which will give the speeds inserted in parentheses: 150 hp. five-cylinder Wright (125 m.p.h.), 170 hp. Curtiss Challenger (132 m.p.h.), and 225 hp. Wright Whirlwind (140 m.p.h.).

Wing Span is 40 Ft.

Wings are secured to the fuselage with trunnion-type fittings. The wing span is 40 ft., the chord 6½ ft., the total wing area 260 sq. ft. and the wings are rigged for a dihedral angle of 2 deg. The wing strut is fastened with screw terminals at the top of the struts, which allows of adjustments of the dihedral angle from zero to 3 deg. The wing tips are slightly curved and equipped with navigation lights.

Ailerons are of the Friese type and are operated by push and pull tubular controls. The total aileron area is 26 sq. ft. The aileron hinges are attached to triangular tubular supports, which in turn are attached to the rear spar and the four drag stations, making a total of four aileron hinge supports. All the control hinges of the ship are fitted with either bronze or oilless bearings.

The wing struts are of streamline duralumin tubing, the after struts being attached to the lower longerons forward of the two side doors, and in line with the fuselage cross-tubes to which the drag struts of the split type landing chassis are also attached. This arrangement makes for simplicity. The wings employ double internal drag bracing, the internal drag struts being of steel tubing. The leading edge of the wing is covered with Alclad.

With the Warner engine, gasoline tanks of 25-gal. capacity are fitted, and with the larger engines, of 35 gal., the tanks in all cases being located in the wings on opposite sides of the fuselage. Tanks are of welded aluminum and elliptical in section. The wings are covered with Flightex and treated with pigmented dope, the top surface being black and the under surface vermilion. Struts are painted silver color.

The overall length of the Air Coach is 28 ft. The fuselage frame is built of chrome molybdenum tubing, and the truss is of the diagonal tubular brace type. Tail surfaces, as well as the ailerons, are constructed of chrome molybdenum tubing.

Immediately above the cabin and aft, the upper side of the fuselage is flush with the wing upper surface. The back of the plane slopes aft and its highest point is about 5 in. above the wing at the trailing edge portion. By streamlining the rudder with the fuselage, Mr. Verville has employed a feature in modern commercial craft which he utilized to advantage in racing design. Two diagonal truss members slant forward from the fuselage front spar tube at an angle of 45 deg., and inward to where they meet the forward fuselage frame members, forming a support for the windshield as well.

The carburetor is fed by gravity, and lubrication is derived from a 5-gal. oil tank located in the fuselage forward of the cabin. Gasoline feed lines are of ½-in. copper tubing and are equipped with air service three-way valves. The gasoline gages are suspended from the wing tanks on each side. A fire-wall is provided to reduce the fire hazard. An engine starter is included in the equipment, and an 8-ft. standard steel propeller is used.

The landing chassis, as previously stated, is of the split-axle type, and utilizes the sponsons as bracing for the Oleo shock struts. Disk wheels, with faired hub caps and fitted with 28 by 4 in. Goodrich tires, are used. The disk tail wheel, also employing an Oleo shock absorber, carries a 14 by 3 in. tire of the same make. The main wheels are fitted with Bendix brakes. Landing stress is distributed through tubular pyramid trussing between the two sponsons.

Counterbalanced Rudder

Structurally, the rudder is of the counterbalanced type and has an area of 9 sq. ft. It is fastened to the vertical fin with two hinges equipped with oilless bearings, the fin being of full cantilever construction. Elevators and stabilizers on the Air Coach are built in two parts, both front and rear spars of the stabilizer being fastened on two fuselage stub spars by means of two bolts. The elevators have a total area of 14 sq. ft., that of the stabilizer being 20 sq. ft., while that of the fin is 4 sq. ft. Right and left elevators and right and left stabilizers are interchangeable.

The stabilizer is equipped with an adjustment device,

having a range of from 3 deg. plus to 3 deg. minus. This device may be operated from the cabin.

Just above the adjustment device, at a point where the top of the fuselage is approximately 2 ft. wide, the Air Coach has a 24 by 10 in. hand-hole for inspection and adjustment of the tail-wheel assembly, and the stabilizing adjustment assembly. The cover of the hand-hole is fitted with four Cinch fasteners. The entire tail-wheel assembly may be removed through the bottom of the fuselage by loosening two nuts. All masts and all control cables are concealed.

The cabin of the Air Coach resembles a modern automobile body in size, lines and appointments. It has a minimum length of 8 and a maximum length of 10 ft. The rear 2 ft. being used for storage purposes. The cabin is 4 ft. high and has an average width of 39 in., its volume being figured at 126 cu. ft. Control wheels are mounted on upright columns which are of the torque drive shaft type, with a spline connection at their base. Either column may be disengaged by unscrewing a knurled nut, and may be removed without disturbing the functioning of the controls proper.

Between the two forward seats is the braking lever. To brake the left wheel the lever is pulled to the left; to brake the right wheel it is pulled to the right. To apply both brakes simultaneously, and for locking the wheels, it is only necessary to press on the ball and pull the lever straight back.

Standard equipment on the dash includes a turn and bank indicator, climb indicator, compass, air-speed indicator, oil pressure gage, oil temperature gage, altimeter, clock, instrument lights, and all light switches, and a Scintilla magneto switch. All the instruments are Pioneer, and are nicely centered on a 27 by 9 in. crackle-varnished dural board. The throttle is of the push and pull type.

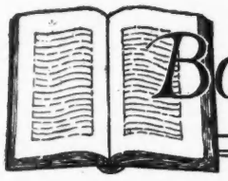
Pittsburgh shatter-proof "Duplate" glass is fitted into the windows by a method similar to that used in automobile body construction. The side windows open by sliding back and forth. Two doors, also fashioned after those of the automobile, are located abreast of one another aft of the two rear seats, allowing easy ingress or egress. Two large skylights, fitted with green pyralin, are set in tandem in the cabin roof, with the cabin electric light between them.

Weight-Horsepower Ratio

With the Warner engine the Air Coach has a weight/horsepower ratio of 21 lb. p. hp. and a weight/wing area ratio of 9.5 lb. p. sq. ft. With the 150 hp. Wright engine the figures are 17.5 lb. p. hp. and 10.5 lb. p. sq. ft., and with the 225 hp. Wright engine, 13.25 lb. p. hp. and 11 lb. p. sq. ft.

The weight of the empty plane with the 150 hp. Wright engine is 1750 lb. and with the 225 hp. Wright engine, 1780 lb., the loaded weights being 2900 and 3200 lb. for the two jobs respectively. Following are condensed specifications of the Air Coach as furnished by the manufacturer:

	Warner	Whirlwind
Wing span	40 ft.	41 ft.
Length overall	28 ft.	28 ft.
Height overall	7 ft.	7 ft.
Wing area	265 sq. ft.	265 sq. ft.
Aileron area	26 sq. ft.	27 sq. ft.
Rudder area	9 sq. ft.	9 sq. ft.
Elevator area	14 sq. ft.	14 sq. ft.
Stabilizer area	20 sq. ft.	20 sq. ft.
Fin area	4 sq. ft.	4 sq. ft.
Incidence	None	None
Weight empty	1,525 lb.	1,750 lb.
Normal gross weight (loaded)	2,400 lb.	2,900 lb.
Disposal load	875 lb.	1,150 lb.
High speed	110 m.p.h.	125 m.p.h.
Landing speed	45 m.p.h.	48 m.p.h.
Fuel capacity	50 gal.	70 gal.
Cruising range	600 miles	600 miles
Sale price	$7,500	



Books for the Business Bookshelf

Industrial Explorers

Maurice Holland, Harper & Bros., New York. 347 pp. $3.

FOLLOWING a style used successfully by Paul de Kruif, this book dramatizes the lives and scientific accomplishments of a group of industrial research men, most of whose names are well known to all persons who follow industrial developments. Of particular automotive interest are the chapters devoted to Willis R. Whitney, General Electric Co.; Elmer A. Sperry, Sperry Gyroscope Co.; L. H. Baekeland, Bakelite Corp.; John A. Mathews, Crucible Steel Co. of America; Charles L. Reese, E. I. du Pont de Nemours & Co., and William H. Miller, Curtiss Aeroplane & Motor Co. The various accounts are "jazzed up" considerably and make interesting reading for leisure moments by the fireside.

Principles of Scientific Purchasing

Norman E. Harriman, McGraw-Hill Book Co., Inc., New York. 301 pp. $3.

THIS book is an attempt to give a concise account of the fundamental principles underlying scientific purchasing methods as they are practiced today. None of the details usually included in books on purchasing methods, such as office methods, stores organization and accounting, etc., have been touched upon but the entire volume is devoted to a discussion of those principles which apply generally to the purchasing function. During the past several years the author has been engaged in the standardization of purchasing procedure and purchases for the largest purchaser of materials and supplies in the world—the Federal Government—as a member of the Federal Purchasing Board, so that the ideas he presents are based upon a range of experience hardly to be excelled.

Production Design

J. K. Olsen, McGraw-Hill Book Co., Inc., New York. 212 pp. Illus.

THIS book discusses design and specifications affecting quantity manufacture of metal products and the proper use of production information, such as tolerance limits, etc., in order to make production design of real use in manufacturing operations. Although the entire range of manufactured products cannot be covered in a single volume, the present book does provide a great deal of information about the more important design problems. These include fits, tolerances, allowances, gears, chamfers, screw threads and similar items. The book contains a number of illustrations and tables which add considerably to its value for the use of production designers.

Just Among

Car "Bootleggers" and Their Supply

THE growing business of new car "bootleggers" which has been causing considerable perturbation in dealer and manufacturer ranks for a year or two past involves several angles not commonly prominent in casual discussions. Obviously the dealer, distributor or manufacturer who sells new cars to a cut rate retailer at a price which enables him to sell at a cut rate to the public and still make a profit for himself is harming the legitimate automobile dealer. That point scarcely needs to be labored. Some elements in the trade must think at least that they have some temporary advantage to gain from dealing with the new car bootlegger or the latter's supply of cars wouldn't continue to exist in as great quantities as it does. Strangely enough, however, a part of the bootlegger's supply seems to come from legitimate elements in the trade who supply him unknowingly.

* * *

How the Stocks are Obtained

THE bootleggers' stocks come from several sources: (1) Established dealers working hand-in-hand with the cut-price house; (2) buyer for cut-price house takes used car, poses as representative of owner, and obtains makes of cars desired at cut rate by trading in the used car "at the right price"; (3) agents for cut-price house apply for and receive appointment as sub-dealers in various towns, get stock of cars, then suddenly move out short time later, all bills having been paid; (4) stocks of superseded models may be sold to cut-price house by manufacturer or distributor or dealer. Other methods of obtaining supplies might be listed but the foregoing include the more important. It should be noted that the cut-price house, while its operations undoubtedly are detrimental to the legitimate automobile trade, does not in itself do anything that is in any sense illegal. It has been customary to blame the cut-rate house for certain evils in the automobile trade. As a matter of fact, it may be more to the point to visualize certain evils which have grown up within the legitimate trade as the reasons for and the opportunity of the cut-rate house. The cut rate house, in other words, probably would not be possible were it not for overproduction on the part of a manufacturer; excessive allowances for used cars on the part of a dealer; existence of inside trading allowances and persistent opposition up until the last 12 months to frank bargain sales of obsolete models on the part of legitimate dealers. Elimination of these and similar difficulties in the legitimate trade would not entirely eliminate the cut price operator, but it would make his operations far more difficult than they are under present conditions.

* * *

Newspapers Can't Reject His Ads

DEALERS in some towns, for example, believe that the newspapers should refuse to carry any advertising from the cut-rate houses. The dealers can't be blamed for wanting that advertising eliminated, but there is no sound basis for blaming the newspapers which carry it. The cut-rate dealer has just as much right to use the columns of the newspaper as anybody else so long as his copy tells the truth and he delivers the merchandise he advertises as he advertises it. The battle is not the newspapers' battle.

* * *

Where the Dealer Out-Cuts the Cut-Rate Man

REPORTS indicate that much of the cut-rate house supply in some sections at least comes as a result of buyers trading in a used car for an excessive sum and having figured the whole deal out carefully beforehand—then being able to sell to the public at a cut rate and still make a profit. Every time a legitimate dealer takes a car in trade for more than he can sell it for he is in reality cutting the price on the new

Ourselves

car himself. In a deal such as the one just mentioned, the legitimate dealer has simply cut prices worse than the cut rate house—otherwise the latter wouldn't be able to make a profit.

* * *

Better Investigation of Dealers Needed

THE ability of an under-cover agent of a cut price house to get appointed as a sub-dealer purely for the purpose of getting a stock of cars at the dealers' discount, again would indicate chiefly a need for more careful investigation of a retailer before being given a line to handle; investigation from every merchandising, service and community angle as well as from the purely financial angle. On this latter score, the under-cover agent usually can be counted upon to rate high and to pay promptly for the cars delivered to him.

* * *

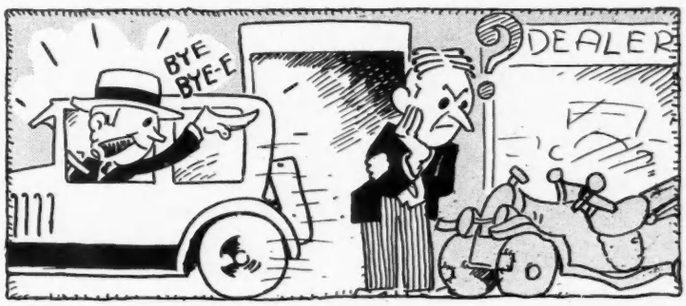
Three Remedial Steps Suggested

THE net of the foregoing comments would seem to be that the cut-rate house is not likely to be eliminated from the automobile retail trade by excoriation, legislation or castigation. Three actions on the part of the legitimate trade should help materially to limit his operations and alleviate the troubles which he brings. These three are (1) Rigid refusal on the part of any manufacturer to sell cars to the cut rate house direct; (2) marked increase in care and investigation before appointing any dealer or sub-dealer; (3) continuance of the effort to "trade right" on the part of every legitimate dealer and active help by manufacturers in making possible such trading on the part of legitimate dealers.

* * *

Frank Bargain Sales Would Also Help

THE type of frank bargain sales on old models indulged in by thousands of dealers in 1928 with the consent of the manufacturers whom they represented should be of a certain value in making the going harder for the cut-price houses as well. We do not hold with the theory that immediate cancellation of a dealer's contract should he be caught in *any* dealings with a cut-price house offers either the best or the surest way out of the situation. Opinion on this score, of course, about gets down to discussion as to whether such dealing constitutes a venal or a mortal sin.



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Chevrolet Scrapping Plan is Succeeding

ABOUT 143,000 cars were destroyed during 1928 under the Chevrolet scrapping plan, R. H. Grant, general sales manager, announced recently. In 1927, he said, about 97,000 were scrapped. These figures indicate that the plan has reached sufficiently large proportions to be a real factor in the used car situation. The 1928 cars scrapped equaled in number about 13 per cent of the total output of Chevrolet cars, while in 1927 the scrapped vehicles came to something like 12 per cent. The continued increase in Chevrolet sales, moreover, would indicate clearly that the allowance put in the car price for scrapping cost has not in any way deterred sales. This experiment is one of the most interesting being made in the industry today and is worth careful watching by every manufacturing executive.

* * *

A Sales-Training Talk Executives Should Read

ANY automotive sales or general executive who hasn't already run across a copy of the talk on "The Place of Training in Sales Management," made by Paul G. Hoffman, vice-president of Studebaker, to the American Management Association some months ago, has missed one of the frankest, most informative and most specific discussions of this vital topic ever given. Somehow or other we missed it until the other day. We are having some copies made so that automotive men may have one if they will just write to us and ask for it.—N.G.S.

New *System* Developed *for* Testing Wheel *Alignment* and Brakes

Floating plates in floor actuate gages which indicate exact condition of brakes and whether toe-in is causing front tires to scrub. Designed for service station use.

By P. M. Heldt

THE development of equipment for the proper servicing of cars naturally lagged somewhat behind the development of efficient factory equipment, but evidence is not wanting to the effect that service equipment is now receiving due attention from competent engineers.

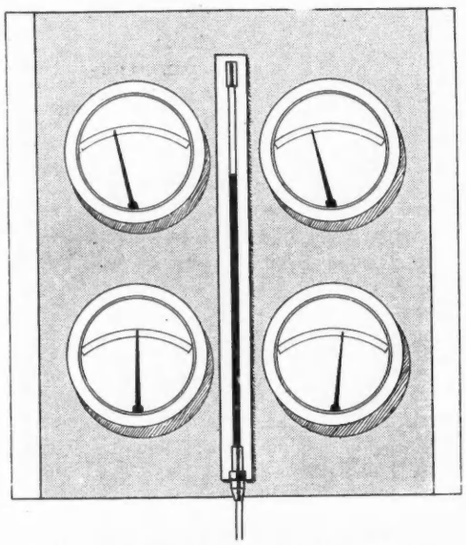
That there is need for efficient equipment for testing the alignment of front wheels, for instance, was strikingly brought out by the report of the Committee on Wheel Alignment of the S.A.E at the recent meeting in Detroit. In the investigations of this committee, it was found that although every manufacturer has his standards for toe-in, etc., many cars leave the assembling line with the toe-in differing considerably from the specified dimension, and in service there are sure to be further changes due to wear, collisions, etc. As toe-in is an important factor in connection with the wear of front wheel tires, it is necessary that it be checked from time to time, and that corrections be made when it is found to differ materially from the dimension specified by the manufacturer, or to be such as to cause a sideward sliding motion or scrubbing of the tire on the ground.

The above comments are prompted by the development of a combined wheel alignment and brake testing equipment by Charles P. Grimes of Syracuse, N. Y., which was called to the attention of the writer on the occasion of the S.A.E. meeting in Detroit recently. Mr. Grimes has been connected with the automobile industry for a long time, having served a number of prominent companies as experimental and research engineer. Some years ago, he decided to establish himself in the brake servicing field, which was then comparatively new as a specialized line of endeavor, and located at Syracuse. In rounding out the equipment of his brake service station, he developed and built a special brake-testing machine which is based on the hydraulic principle and indicates on a large dial the retarding force produced by each of the four wheels.

One advantage of the equipment is that it is flush with the floor and therefore does not take up any floor space, in the sense that the space occupied cannot be used for other purposes when no brake testing is being done.

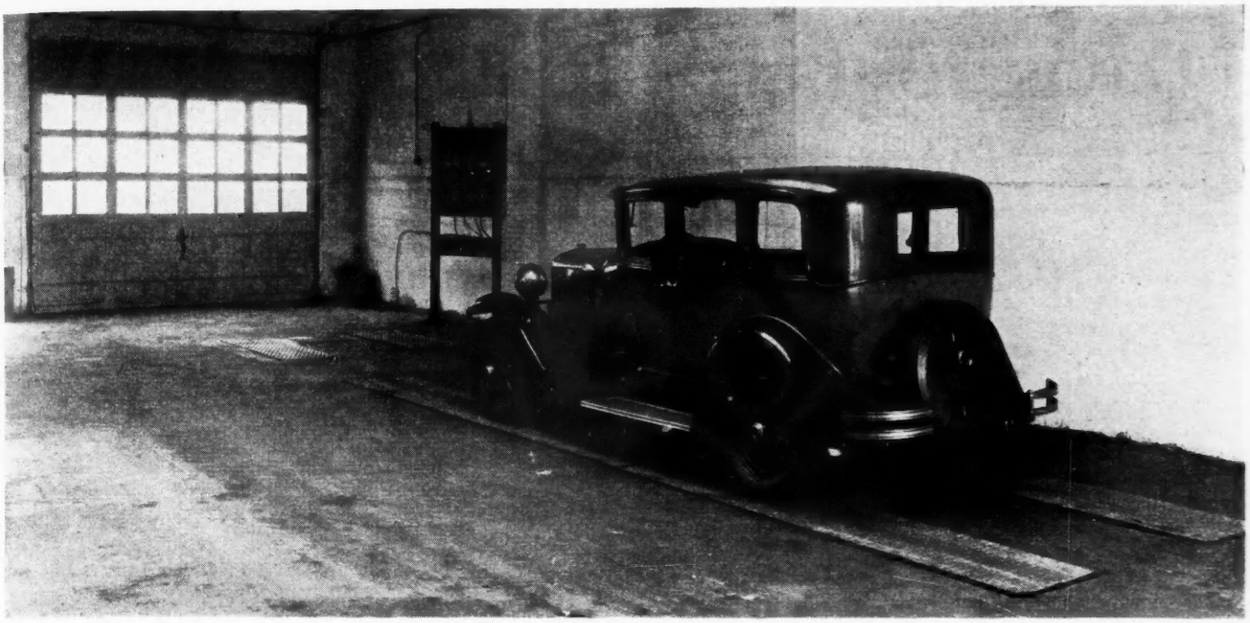
As may be seen from the illustration, there are four places or planks let into the floor, onto which the car is driven. Each of these plates float, so that it can move slightly horizontally in the direction of its length under forces produced on it by positive or negative accelerations of the car. When a driving force is being exerted through the wheels the latter push backward on the plates, while when the car is being braked there is a forward push on them, that is, a push in the direction in which the car moves.

Each of the plates is connected through suitable mechanism to a piston in a cylinder filled with liquid and from each cylinder a tube connects to a pressure gage mounted on an instrument panel, at such a height above the floor that the dials can be read conveniently. When making a test of the brakes, the operator drives the car onto the plates and then applies the brakes. The adherence between the tires and the plates immediately causes a slight movement of the latter and places the fluid in the cylinders under pressure, the pressure in each cylinder being registered by the corresponding dial. The gages are of the type in which the indicating hand remains in the maximum position to which it has been moved, so it is not necessary to make instantaneous readings. The dials, moreover, are graduated, not to show the pressure on the liquid in the system but the force exerted on the plate by the tire, which is proportional to the former. After readings have been taken, all indicator hands are returned to zero by pushing an electric button switch.



Instrument panel carrying four brake gages and an alignment gage

The Grimes service station is of the "drive through" type, and as a rule, when a test of the brake holding power and of wheel alignment is made, the driver does not leave his seat. Upon entering the station, he drive right onto the plates of the brake-testing equipment, applies his brakes exactly as in making a short service stop, then drives on over the wheel alignment de-



Brake and wheel alignment test installation in Grimes' service station

vice and out through the rear door, the whole procedure generally occupying less than two minutes. This applies to a single test. Of course, if the test shows that the brakes hold very unequally or that there is side slipping of the treads of the front wheels, adjustments are made and the car is driven over the plates once more to determine the effect of the adjustment.

The wheel alignment test equipment is located beyond the brake test equipment and it comprises a pair of plates flush with the floor onto which the front wheels of the car may be driven. These plates are so arranged that they have a limited freedom of motion in the transverse direction. When the alignment of the front wheels is faulty there will be sideward motion of the elements of the tire tread, which would ordinarily result in slippage of the tread on the ground. In this case the result is a lateral movement of the two plates one relative to the other, which movement is indicated by a column gage on the same instrument panel as the four dial gages which indicate the holding power of the brakes. If the wheels toe-in too far, the level of the liquid in the column will rise, whereas if the toe-in is insufficient the level of the column will sink.

Gage Extremely Sensitive

This wheel alignment gage is said to be so sensitive that a misalignment of 0.003 in. is indicated. Each of the two plates is 2 ft. wide by 6 ft. long, and the operator drives the car over them at perhaps 2 m.p.h. Both plates are mechanically connected, so that they always move at the same speed but in opposite directions. Unless the wheels are in perfect alignment and there is no tendency for their tires to "scrub," the plates either approach or recede from each other. The calibration constant is such that a rise or fall of the column of $\frac{1}{8}$ in. corresponds to a plate movement of 0.003 in.

In connection with the brake-testing equipment the question has been raised as to the effect of the inertia of the large plates, which are 10 ft. long each, and, like the alignment-testing plates, 2 ft. wide. It is contended, that, since the motion of these plates is only from 1/32 to 1/16 in., their inertia is a very small factor. It would seem, moreover, that the inertia force on each plate must be directly proportional to the braking force exerted on that plate, hence the actual braking forces of the different brakes bear to each other the same relation as the indications of the dials. At any rate, when the braking forces are equal, which is the condition striven for, the inertia forces of all of the plates will be equal.

As an indication of the sensitiveness of the equipment, Mr. Grimes mentions that by pressing on the plates with the bare hands and pushing in the direction of their length, a reading can be obtained on the gages. Also, by standing on the plates and moving one's arms rapidly, one can obtain a gage reading. In the case of the aligner, the plate may be moved with the foot such a slight distance that the eye cannot discern any movement, yet the column gage will indicate the movement.

Mr. Grimes points out that for minimum tire wear it is not sufficient that the front wheels have perfect rolling motion when in the straight ahead position, but the same condition must be substantially maintained when the wheels are swung through a considerable angle by the steering gear. His wheel alignment equipment will serve equally well for checking the rolling conditions when the wheels are swung around. To make such a test it is only necessary to approach the wheel alignment plates at an angle but drive onto them squarely with the front wheels. Absolute absence of scrubbing of front tires when describing curves is impossible with the present type of steering linkage, but the scrubbing should be held to a minimum. It appears that in some cases conditions have deteriorated in this respect in recent years, because the introduction of front-wheel brakes has made it difficult if not impossible to give the knuckle arms the proper angle for steering with the least amount of scrubbing.

The apparatus above described is not a regular article of manufacture at the present time but has been installed by Mr. Grimes in his service station for use in connection with his brake servicing business. He has, moreover, made an arrangement with tire dealers in Syracuse whereby the latter, when they receive complaints of excessive wear of front tires, direct complainants to his station to have their wheel alignment tested and corrected.

Davis to Build Small Monoplane With Folding Wings

Two-passenger machine has duplicate controls and weighs 660 lb. empty. Cruising speed is 90 m.p.h.

A SMALL plane described as adapted for both business and pleasure, for club use and for instruction purposes, is to be manufactured by the Davis Aircraft Corp., Richmond, Ind., and will be known as the D.A.C., or the American Moth monoplane. Powered with a LeBlond engine it has a cruising speed of 90 m.p.h., a top speed of 115 m.p.h. and a landing speed of 38 m.p.h. The weight of the plane, empty, is 660 lb. It has an overall length of 18 ft. and a height of 6 ft. 9 in. Except for the wing spars and the fabric covering of the wings, the construction is of metal throughout. By the removal of four pins the wings can be folded back, permitting of storing the machine in a small hangar.

D. A. C. monoplane in flight

The fuselage is made of welded steel tubing and rigidly braced. It has a rectangular section at the fire wall, which becomes trapezoidal at the cockpits and tapers to a vertical knife edge at the rear.

The engine mount is of welded steel tubing and is detachable by means of four pins. Sufficient space is available in front of the aluminum fire wall for the installation of a starter, which is offered as additional equipment.

The wing unit consists of a center section which contains the fuel tank and is supported by struts of streamline steel. The spars are of spruce. Ribs are of sheet duralumin. Wing panels are tapered both in form and section, for the maximum aerodynamic and structural efficiency.

Duralumin Tube Struts

Drag bracing is by means of duralumin tube struts and hard wire, the tension members being in the form of a Pratt truss. The wires are doubled.

Ailerons of ample size are hinged to the auxiliary spars in a novel manner making possible an air-tight joint. The construction is similar to that of the panels.

The lift struts are of round steel tubes, faired in with ribs of a high lift airfoil section, and covered with cloth. These struts have an area of slightly more than 12 sq. ft. and add about 100 lb. of lift, at the cost of a very slight increase in resistance.

Wing spars are of selected airplane spruce, of the two-piece laminated box type. Spars are of solid section at points of location of important wing fittings. The large depth of spars, in conjunction with the double drag bracing that ties the tops and bottoms together, makes possible a very rigid structure. Ribs are of sheet duralumin which is formed to channel section and lightened.

All fabric covers are of the slip-on type, sewed in place. The metal members are wrapped with tape before covering. Five coats of clear dope and two coats of lacquer are applied to the fabric.

Shock struts and axles are of chrome-molybdenum steel, heat-treated and faired to streamline form. Radius struts are streamlined steel tubes.

Air controls are of the conventional "joy stick" variety, while directional control is by means of a rudder bar. The controls are in duplicate, so that either passenger may fly the ship. If for any reason it is desired to render either set inoperative, this can easily be accomplished by removing one stick and disconnecting the front rudder, a matter of removing three pins which are conveniently located. Spring clips are provided on the sides of each cockpit, for the reception of the sticks when so removed. Sticks are of maple and are provided with rubber grips. The rock shaft is a heavy steel tube mounted on three lubricated bearings.

The stabilizer is adjustable, through a range of 4 deg. plus and 2 deg. minus, by means of a lever and ratchet located on the left-hand side of the rear cockpit. Control is by means of a duralumin push rod, and it is stated that the ship can be flown safely without using the elevator control. The purpose of an adjustable stabilizer is to vary the "trim" of the ship at will, thus enabling the pilot to fly "hands off" for long periods of time.

The shock absorber unit is of rubber cord, and the tail skid is of the leaf-spring variety.

Ailerons are controlled by means of a duralumin tube attached to the rock shaft lever which actuates

duralumin push rods within the wings, connecting by bell cranks to the aileron horns. The rudder is actuated by means of flexible steel cables, no pulleys being required. Engine controls are in duplicate.

Spars and edges of the tail unit are of steel tube, and the ribs are of sheet steel, formed to section and lightened. All joints are welded, and spars are reinforced where horns are attached. The vertical surfaces are internally braced, taking advantage of the deep section of the fuselage; the stabilator and elevator are braced by means of a streamline section strut on each side.

The undercarriage is of the split axle type, which is considered best for cross-country work. The gear is placed well forward, to eliminate nosing-over possibilities. The structure is designed for brakes, which are supplied as optional equipment. Wheels are of the wire-spoke type, 26 by 4 in., equipped with aluminum disk streamline covers.

In addition to the LeBlond 60-hp., five-cylinder and 90-hp., seven-cylinder air-cooled radial type engines the new Anzani 60-hp., as well as the Anzani 80-hp. and the Ryan-Siemens 70-hp. engines can be built into the plane.

The propeller is of the conventional two-blade type made by Hartzell. It is equipped with a spinner hub, to which is attached an aluminum cap which completes the lines of the bullet-like nose.

Exhaust gases are handled by a collector ring which outlets below the fuselage.

The fuel tank is located in the center section, away from the engine, and holds 25 gal. It is made of welded sheet aluminum. Feed is by gravity through copper lines. An oil tank of three-gallons capacity is located in front of the fire wall just over the engine mount.

The engine and cockpits are cowled with heavy sheet aluminum; the former are supplied with louvers to carry off gases and aid in cooling. Cockpit cowls are equipped with "rolls" making the edges comfortable.

The front cockpit is accessible by means of a door on the left side, and steps, while there are steps on the side of the fuselage for the rear cockpit.

Since it is customary to fly the plane from the rear seat, all instruments are placed on the rear board. A unit board, made by the Consolidated Instrument Co., is used, comprising an altimeter, tachometer, oil-pressure gage and oil-temperature gage, which are inclosed within a lighted panel. A battery is optional equipment. The seats are of the aluminum bucket type, well upholstered. Belts are provided.

Alvis Introducing Straight-Eight

THE makers of British Alvis cars have announced that the range of the front-drive model is to be supplemented by the introduction of a supercharged straight-eight with a piston displacement of 1½ liters (55 x 78.5 mm. bore and stroke). Alvis developed a four-cylinder front-drive chassis for racing some two years ago and standardized it for road use last year. Shown at Olympia in October last with two-seated and four-seated open bodies, it was then and still remains the only British make with front-drive. Demand has exceeded expectations and since the Olympia show a sedan model has been standardized. This four-cylinder model is now being offered either with or without a supercharger.

The new eight has two overhead camshafts operating valves set at 90 deg. in the hemispherical combustion chamber, piston-type followers being used between cams and valve stems. The crankshaft has five bearings, two of these being of the roller type, while the big-ends also have roller bearings. Ignition is by two polar-inductor magnetos driven directly from the ends of the camshafts. Pump-assisted thermo-siphon water circulation is used. A Roots blower forms the supercharger and is driven from the distribution gear. A multiple-disk clutch is fitted. The four-speed gearset and spiral bevel final drive form a unit construction at the front end of the engine. The chassis is practically identical with that of the four-cylinder front-drive Alvis, having independent springing front and rear and an unusual low frame height.

This new Alvis is offered at £700 for the chassis, with two-seated or four-seated open "speed" bodywork at £825, or with a sedan body at £875. The supercharged front-drive four is £750 as a sedan.

Modern Aircraft Engines

OWING to the restrictions of the Treaty of Versailles, incentives for the development of aircraft engines in the direction toward higher outputs were lacking in Germany until a short time ago. Two years ago these restrictions were removed, and as in the meantime civil or commercial aviation had assumed considerable importance there, some of the manufacturers who had built aircraft engines at an earlier period resumed their activities in that line, while new firms also entered the field. This created a demand for information regarding the progress in engine design which had been accomplished—necessarily mainly abroad—since about 1920. To meet this demand the firm of Richard Carl Schmidt & Co. has issued a book on Modern Aircraft Engines (Neuzeitliche Flugmotoren, by H. Katz), which deals with the leading production in this line of Germany, England, the United States, France and Italy.

While the work is mainly descriptive, some of the problems confronting aircraft engine designers today, such as water cooling vs. air cooling, radial vs. inline construction, etc., are critically illuminated by the author. In addition to engines proper, such accessories as carburetors, fuel pumps, starters, reducing gears and superchargers are also dealt with. The book is profusely illustrated.

WE have received a copy of Research Report No. 312 of the Verein Deutscher Ingenieure entitled Untersuchung der von Spritzvergasern gelieferten Zerstaubung (Investigation of the Atomization in Spraying Carburetors), by Dr.-Ing. J. Sauter. The research work dealt with in this report was carried out in the Laboratory for Applied Physics of the Munich Technical College. The author has developed a new method for measuring the average radius of the fuel particles in a combustible mixture, dependent upon the interception of light by the mixture as determined by photometric measurements. With a given rate of fuel delivery the number of particles passing per unit of time is inversely proportional to the cube of the mean radius. The mean cross sectional area, and also the mean surface area is proportional to the square of the mean radius, hence the aggregate cross sectional area of the particles passing per unit time, which determines the reduction in the intensity of light, is inversely proportional to the mean radius.

NEW DEVELOPMENTS . . . . . .

Ingersoll-Rand Compressor

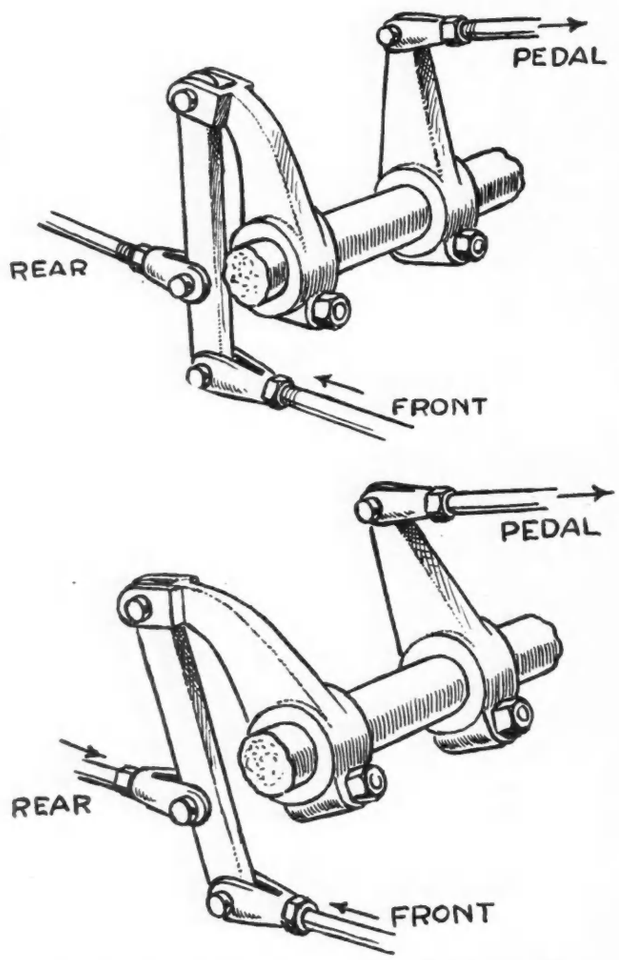
INGERSOLL-RAND CO., 11 Broadway, New York City, announces a new direct-connected, gas-engine-driven air compressor, designated as the Type XG. It consists of a two-cylinder, four-cycle gas engine, direct connected to Ingersoll-Rand compressing cylinders with I-R plate-type valves. The compression end of the equipment can be furnished to accommodate any of the usual conditions of pressure range and the equipment is adapted to continuous service in the oil and gas industries, or for general industrial use.

Limits Rear Brake Application

A MEANS whereby a limit is set upon rear brake application while allowing scope for further braking effect to be obtained from the front brakes has been introduced by the makers of the Alford & Alder front axle and brake equipments, which are used by many British manufacturers, on both passenger cars and trucks.

The scheme, shown in the accompanying illustration, consists of securing the front and rear pull-rods to a link depending from a bent lever on the brake cross-shaft, the latter also carrying the lever from which a pull-rod runs to the brake pedal.

Up to a certain stage the swinging link acts as a compensator between front and rear brakes, but when pedal pressure is such as to give rise to risk of the rear wheels being locked and skidded, the link—at a point in line with the rear pull-rod—comes into contact with the cross-shaft; the latter then forms a "stop" for rear brake application and a pivot centre about which the link can swing to permit more forcible application of the front brakes. Thus the maximum advantage is gained from the braking equipment as a whole, instead of the front braking effect being limited, in practice, by the adhesion between the rear wheels and the road.



Alford & Alder brake coupling, which sets a limit upon rear braking while permitting full use to be made from the front brakes. Bottom: Swinging link acting as equalizer with normal pedal pressure. Top: Link in contact with cross-shaft when pedal pressure is applied for heavy braking

Link-Belt Cranes

A LINE of locomotive cranes driven by gasoline engines, Diesel engines or electric motors has been announced by the Link-Belt Co. of Chicago. They are known as the L-type cranes.

The drive from engine or motor is by an inclosed silent chain, and all upper frame gears have machine-cut teeth, cut from solid blanks. The crane is furnished with a two-speed travel gear to give a high travel speed for traveling light, and a lower travel speed for pulling heavy loads or ascending comparatively steep grades. The two-speed travel gear does not affect the other speeds of the machine (hoisting, boom hoisting and rotating), which should remain unchanged under all conditions in order not to affect the operating speed and handling capacity of the machine.

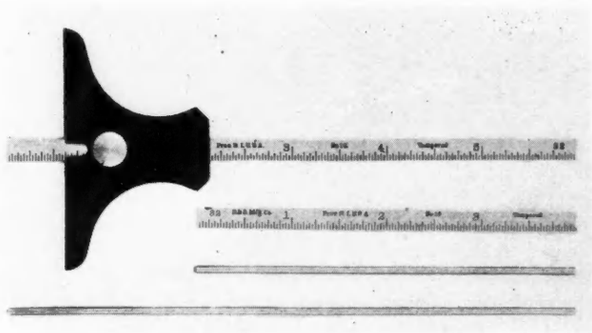
"Boost Gage"

WHAT is referred to as a "boost gage" was exhibited at the recent annual exhibition of the Physical and Optical Societies in London by Negretti & Zambra, London. It serves to indicate the absolute pressure in the inlet manifold of an internal combustion engine, particularly those fitted with superchargers. An aneroid barometer movement, consisting of a diaphragm of nickel-silver or steel, and a quadrant and pinion gear, is mounted in an air-tight case which is connected with the inlet pipe. The zero of the scale corresponds to the normal barometric pressure.

Rule Depth Gage

BROWN & SHARPE MFG. CO., Providence, R. I., has developed a rule depth gage so designed that in addition to using either a 4-in. or 6-in. rule, a rod 5/64 in. in diameter can be used for measuring in small holes. The blades of the 4-in. gage are furnished with No. 10 graduations and of the 6-in. gage with either No. 10 or No. 11 graduations, English

. . . Parts, Accessories, Production Tools



B. & S. rule depth gage with rod

measure. The metric measure blade is graduated in millimeters and half-millimeters. The base is about 2½ in. wide.

G. E. Switches and Relays

THE General Electric Co., Schenectady, N. Y., has added to its line new relays with renewable heaters and a line of new magnetic switches for starting small alternating current motors. In the relays a complete line of double and triple-pole temperature overload units are offered whose principal advantages are that the user can remove and insert new heating elements when necessary, and which allows the use of a third relay unit on the same base when it is desired to protect three legs of a circuit.

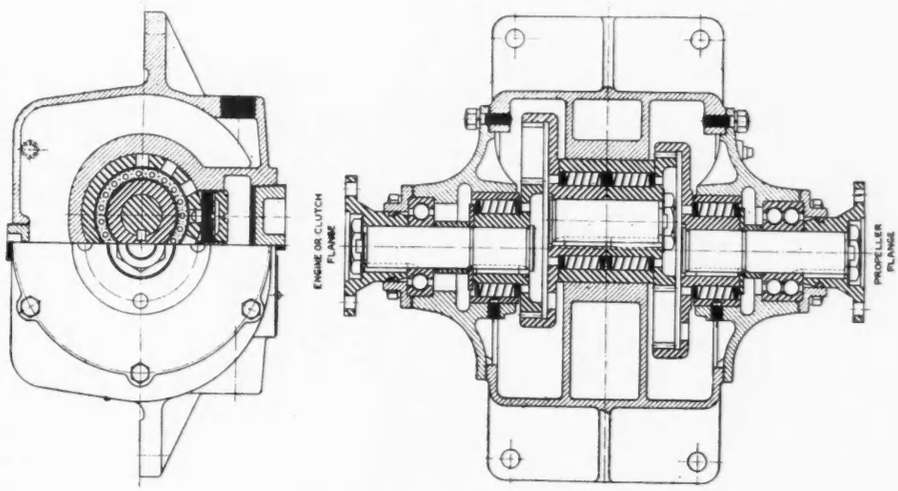
The new switches consist of a three and four-pole magnetic switch with self-contained start and stop stations, and a switch for similar service, but especially designed to provide plenty of wiring space.

E. C. Time-Current Control

THE Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, Ohio, has developed a new time-current control which uses an accelerating relay operating on a new principle and having unusual characteristics. The acceleration relay has all the advantages of all the existing systems of acceleration, but on heavy loads longer time up to 2 seconds per step is obtained automatically and without any adjustment. On normal loads, forced acceleration gradually increases the torque until the motor eventually starts.

Morse "Straight-Line" Reduction Gears

"STRAIGHT-LINE" reduction gears were exhibited at the recent New York motor boat show by the Morse Chain Co. of Detroit. These embody the use of internal gears and are somewhat related to automobile transmissions with that type of gear, on which the Morse company has been doing development work for a couple of years. As shown by the sectional view herewith, there are two pairs of gears in tandem, the first driving shaft carrying the engine or clutch flange and the final driven shaft carrying the propeller shaft flange. All shafts are firmly supported in roller and ball bearings.



Morse motor boat reduction gear using internal gears

These "straight-line" reduction gears are being manufactured in five sizes suitable for engines of from 15 hp. at 3000 r.p.m. to 200 hp. at 600 r.p.m. They are adopted for use with Diesel as well as with carburetor-type engines. In the smaller sizes they are made with reduction ratios of 3 to 1 and 2 to 1.

The advantage of internal gears for marine reduction gears is that they operate quietly; besides, by using two pairs of the same ratio, a straight-line drive is obtained, which has well-known advantages in marine installations. The flanged housing is secured directly to the engine bed sills, which permits of installation in a boat already in service without changing the positions of the engine and of the propeller. The direction of rotation of the propeller is the same as that of the engine.

Owing to the use of ball and roller bearings throughout, the efficiency of transmission is very high. Any kind of transmission oil can be used in the case for lubrication. Since the gear unit must be installed in a position where ventilating conditions are naturally poor, special provisions have been made for water cooling. The gear unit is surrounded by a water jacket of ample size and is provided with suitable connections for attaching directly to the engine cooling system.

Closer Study of *Tolerances* Would *Prolong* Bearing Life

Striking inconsistency found in practices of different car manufacturers in various countries. Methods followed here are superior to those used in Europe.

A STUDY of the tolerances employed in the automobile industry by different manufacturers in the various countries makes apparent a singular and striking inconsistency, says *La Revue des Roulements a Billes*. While some use mountings with a free sliding fit, others in the same places make use of tolerances which give a press fit. The finished product, that is to say the chassis, is a usable article in both cases.

These differences of opinion regarding the mounting of bearings are explicable in certain cases by differences in design, but it is certain that the principal cause is an unnecessarily rigid opinion with respect to tolerances, at least as regards the different characters of tolerance which are permissible. It must be admitted also that the problem of tolerances is not accorded sufficient attention. For instance, as a result of a single examination it has been concluded that in a given place the bearing should be mounted with certain pressure; thereupon the same tolerances are applied everywhere, even if the load conditions are entirely different from those in the first case. Thus a designer may have acquired his experience in regard to ball bearing tolerances in a place where the shaft is non-rotatory with respect to the direction of the load, and, as a result, a free fit is employed for all the parts of the machine. Another designer, on the other hand, having recognized the disadvantages of too free a fit of the ball bearings in transmission housings, is thereby induced to apply press fits, everywhere, even on the front wheel spindles.

Now, such a unification of tolerances necessarily results in excessive closeness, which often quite materially increases various manufacturing difficulties.

In the United States the designers of automobiles, who have still more experience than their European confreres, habitually apply at least two different types of tolerances: One is used where the shaft turns with respect to the direction of the load; the other, where the outer race turns with respect to the direction of the load. The final result evidently is better than if only a single type of tolerance were used, as is the proctice of a large number of European manufacturers.

The advantage is not only to the manufacturer, who may use larger tolerances, but also to the user, as the bearings will have a longer life. A still better result is obtained by better determination of the tolerances and by using in each place the tolerance which is the best for that place from every point of view. In that case it is possible to use a substantially lower degree of precision and to avoid unsuitable fits. The additional number of milling cutters and measuring tools necessary for the application of several types of tolerance is not objectionable as a rule, as large quantity production is considered.

Fig. 1 is a comparison of some tolerances practically used for shafts designed to receive ball or roller bearings. The examples were taken from the United States, France, England, Germany and Italy. The tolerances indicated apply to mountings at points which are absolutely comparable. In the case of a turning shaft, the rear axle pinion shaft was chosen, and in the case of a fixed shaft, the spindle of one of the front wheels. The values given apply to ball bearings with the international manufacturing tolerances, that

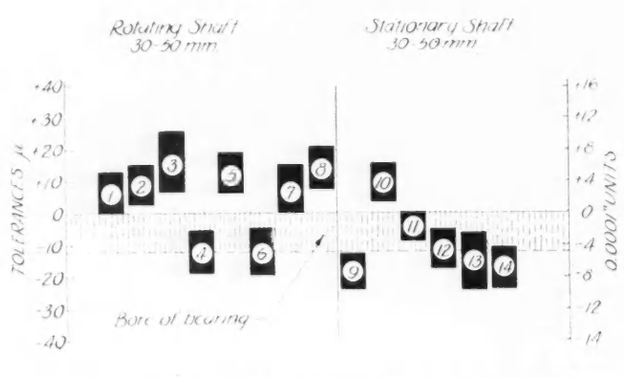


Fig. 1—Diagram of tolerances used on shafts intended to carry ball or roller bearings

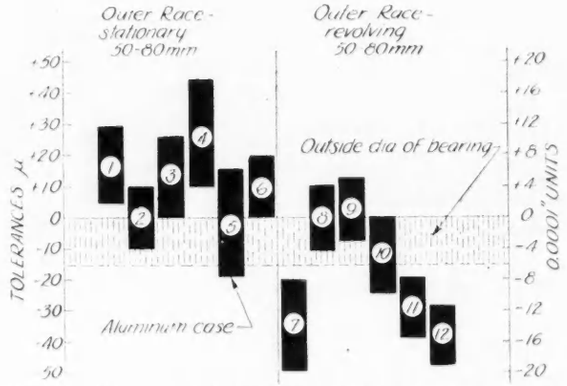


Fig. 2—Diagram of different tolerances for bearing seats

In the figures the horizontal cross-sectioned strip represents the tolerance on the bearing, which is evidently + 0, — 12 in Fig. 1 (bearings of 30 to 50 mm. bore) and + 0, — 15 μ in Fig. 2 (bearings of 50 to 80 mm. bore)

is, those employed by the SKF works and other European and American ball bearing manufacturers.

The data given in the figure bring out the fact that for rear axle pinion shafts the tolerances are — 20 μ* and + 26 μ and for front axle spindles, 25 μ and + 15 μ. Now the question arises whether a designer could allow this entire tolerance of say — 20 μ and + 26 μ. The reply is necessarily in the affirmative, if one does not take account of the eventual differences in mounting and if one admits that all of the tolerances used are practical. However, an investigation shows that this is not the case. If one visits a repair shop on may readily convince himself of the objections there are to using too free a fit for the rear axle drive pinion bearing. It may therefore be concluded that if a pinion shaft is machined to a diameter less than the nominal diameter, it is unsuitable if there is any pretension of turning out a good chassis, one which will give good service not only when new but also after it has seen extensive use. As regards the maximum permissible diameter of the shaft, that depends on the play within the bearing employed.

If an adjustable roller bearing is employed which is insensitive from the point of view of play, one may use a larger diameter and therefore use larger tolerances than with the conventional ball bearing. Examples 3 and 8, and probably also 5, relate to bearings which permit of a greater expansion of the inner race than can be withstood by the races of ball bearings. For the latter it seems that examples 1, 2 and 7 represent good solutions.

Examples 9 to 14, which show different tolerances for front wheel spindles, indicate the limits of the tolerances — 25 μ and + 15 μ. There has never been any trouble from using comparatively free fits at the point referred to. On the contrary, a pronounced press fit makes the mounting of the bearing, and ever more the dismounting, quite difficult. The firms which are using this style of mounting usually furnish special tools for the removal of the bearings. However, as there seems to be no real need for this press fit, it may be said that this practice has nothing to recommend it.

One may consider the free fit equally applicable here as the sliding fit. Examples 9 and 14 are of sliding fits, which are therefore unnecessarily fine. Example 13 represents the most suitable solution.

Fig. 2 is a similar comparison between different tolerances for bearings for the two styles of loading. Nothing need be said concerning examples 1 and 6. As regards front wheel hubs, an inquiry in repair shops leads to the very definite opinion that the tolerances of examples 8, 9 and 10 are unsuitable. A free fit of the outer ring gives rise to a lamination between the seat and the outer ring, which sooner or later causes an enlargement of the hub, the wall of which is generally quite thin.

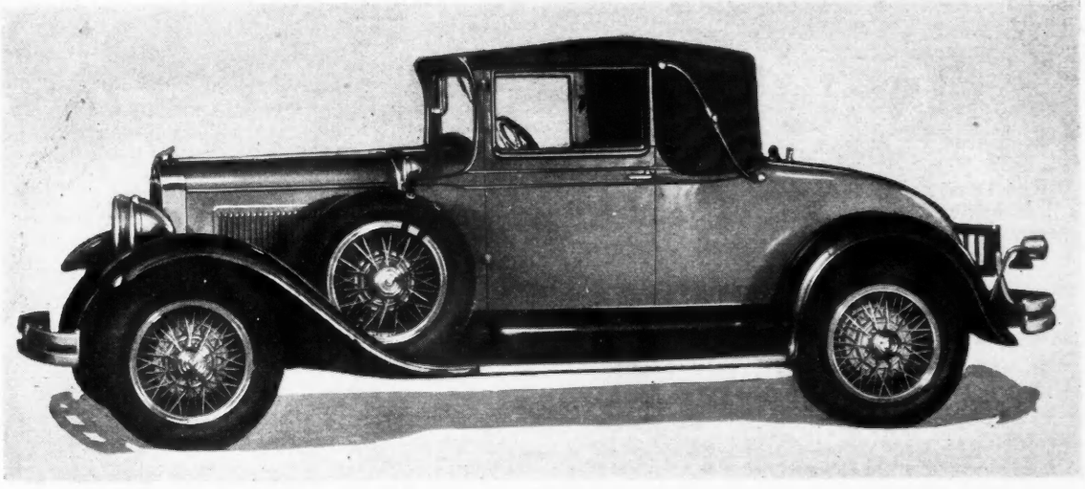
*The letter μ represents the micron, the thousandth part of a millimeter or about 0.00004 in.

Steering Wheel Production

IN the manufacture of the Husted safety steering wheel, which is now said to be standard equipment on 15 passenger car models, the first operation consists in stamping out a large sheet metal disk. In a second operation four sections are stamped out from this disk, leaving a spoked wheel with center disk, four spokes and rim. In the third operation the rim is perforated with small holes, about an inch apart, extending all around the circumference. The spokes are perforated in the same way.

The center of the center disk is then stamped out and the flat skeleton fed into a press where rim and spokes are shaped in such a way as to greatly increase the rigidity of the spider. An auxiliary rim is then spot-welded over the center portion of the spider to give it greater strength and rigidity around the bearing or hub. Finally the whole skeleton is incased in "Ace" hard rubber under great pressure.

New Studebaker Commander Cabriolet

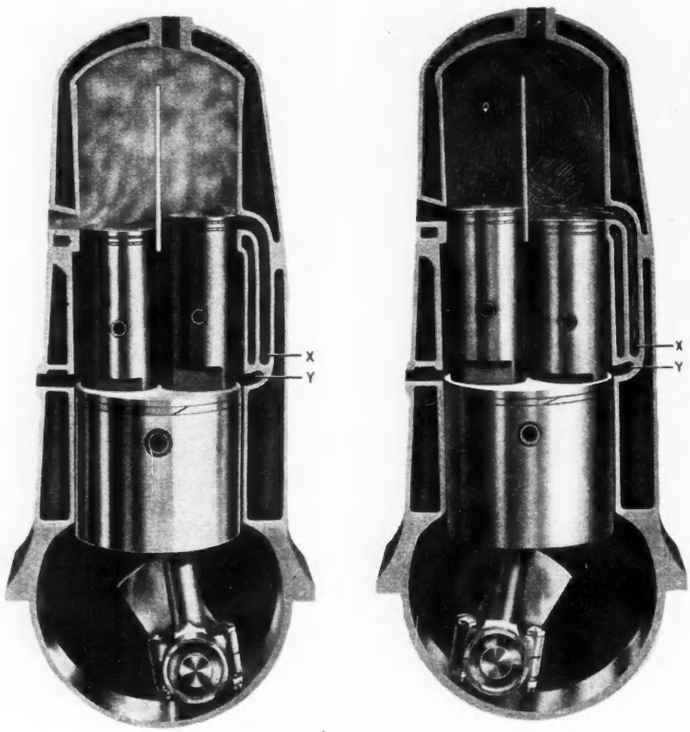


THIS new Commander model is supplied with either six or eight-cylinder engine. Two spare wire wheels, which are standard equipment, are carried in the wide front fenders. The line of the rear deck, which incloses a comfortable rumble seat for the occasional extra twosome, is unusually graceful. The folding luggage carrier in the rear is designed to harmonize with the curve of the rear deck and fenders. Big chromium-plated hub caps, brightly-plated top bows and chrome-plated retaining rims on the wheels add distinctive touches

Novel *Piston* Arrangement Devised for Two-Cycle *Engine*

Port action improved by use of two working pistons which are connected to opposite ends of "T" on compressor piston connecting rod. Tests now in progress.

A PECULIAR type of internal combustion engine working on the two-stroke cycle and using either the preformed-mixture, electric-ignition or the Diesel compression-ignition principle has been developed by Wilhelm Bertil Bronander of New York. From the accompanying sectional views it can be seen that there are pairs of power cylinders side by side which are operated as a single compression and expansion chamber, the two cylinders communicating at the top. The two pistons in each such pair of cylinders are connected through short connecting rods to the T-head of the main connecting rod. The result of this arrangement is that the two power pistons are in phase only at the top and bottom of the stroke, while at all intermediate positions one piston leads the other.



Figs. 1 and 2—Two sectional views of the Bro-Hawk two-stroke engine. In the first view the crank is shown in a position slightly ahead of the lower dead center, and the exhaust port is fully open. In the second view the crank is shown some distance beyond the lower dead center; the exhaust port is fully closed while the transfer port is still wide open. This differential port action is due to the connection of the working pistons to the T-head of the main connecting rod. At X scavenging air enters from adjacent supercharger cylinder while at Y scavenging air passes to adjacent power cylinders

The engines operate on the supercharging principle, supercharging of the working cylinders being effected by means of a piston-type pump whose piston is connected to the upper end of the main connecting rod and works in a bore below and symmetrical with the two power cylinders. This pump piston, whose effective displacement is equal to its total displacement minus the combined displacements of the two power pistons, is so proportioned as to give the desired supercharge to the working cylinders, the supercharge worked with being 8 lb. p. sq. in. gage in the gasoline engine and 12 lb. in the Diesel engine.

Three pairs of working cylinders are used and the cranks are set at 120 deg. with each other. The air delivered by the "crosshead" pump of No. 1 pair of cylinders is transferred to the No. 2 working cylinders; that from the No. 2 "crosshead" pump to No. 3 working cylinders and that from No. 3 "crosshead" pump to No. 1 cylinders. All connecting passages between pump cylinders and working cylinders have equal volumes, so as to obtain equal compressions.

There are no valves in this engine, the valving functions being performed by the pistons in conjunction with ports in the cylinder walls and in the pistons themselves. Admission of the new charge or air to the supercharger or pump cylinder is controlled by the "out-of-step" motion of the power-pistons in the pump piston. After admission the charge of combustible mixture or air is trapped in the pump cylinder for compression.

Among the advantages claimed for this type of two-stroke engine are that crankcase compression is eliminated, and that there is no side thrust due to connecting rod angularity on the walls of the working cylinders, all such thrust being taken up on the compressor cylinder wall, the piston of the compressor serving both as such and as a crosshead.

Connecting rods and power pistons are of Lynite, while the crosshead pistons are of a special grade of cast iron that permits of thin sections and light weight. The Diesel engine, we understand, has been operated at speeds up to 2000 r.p.m. and the gasoline engine at up to 3000 r.p.m., though the speeds of maximum efficiency and maximum output are found

somewhere below these figures.

We are informed that the engines operate very smoothly, without perceptible vibration, at speeds of 1200 and 1500 r.p.m. respectively, there being no reversal of stress in the connecting rods in two-stroke operation at these speeds.

In the Diesel engine the fuel is introduced by means of a Bosch pump and Bosch spray nozzle. At no load the exhaust is colorless; there is a slight blue vapor at all loads up to near maximum, at which point the color darkens. However, under no operating conditions is there objectionable smoke in the exhaust, even with the small combustion space of a cylinder of 2.75 in. bore.

In the gasoline engine the fuel mixture from a commercial carburetor is admitted to the intake manifold, which is provided with the usual hot spot, and thence passes into the supercharger cylinder through ports provided in the wall thereof. This is the arrangement that was used when making the tests of which the results are given below. Another experimental arrangement has been worked out, in which only air is drawn in through the supercharger and discharged through a separate carbureting device.

Tests of these engines are being made by H. Moren, a Swedish engineer with many years of experience in the manufacture of Diesel engines in Sweden and extensive experience with gasoline engines in this country. Preliminary results are given in the following:

DIESEL TYPE

Working piston displacement	166.32 cu. in.
Crosshead piston displacement, effective	334.60 cu. in.
Stroke	7 in.
Brake horsepower at 1100 r.p.m. maximum	49
Cubic inches cylinder displacement per brake horsepower—at 49 hp.	3.40
Fuel oil consumption per brake horsepower-hour at 32 hp. at 1100 r.p.m.	0.50-0.55 lb.
Lubricating oil per brake horsepower-hour	0.010 lb.
Weight of engine per brake horsepower (49 hp. maximum) excluding flywheel	21.2 lb.
Mean effective cylinder pressure	108 lb. per sq. in. maximum

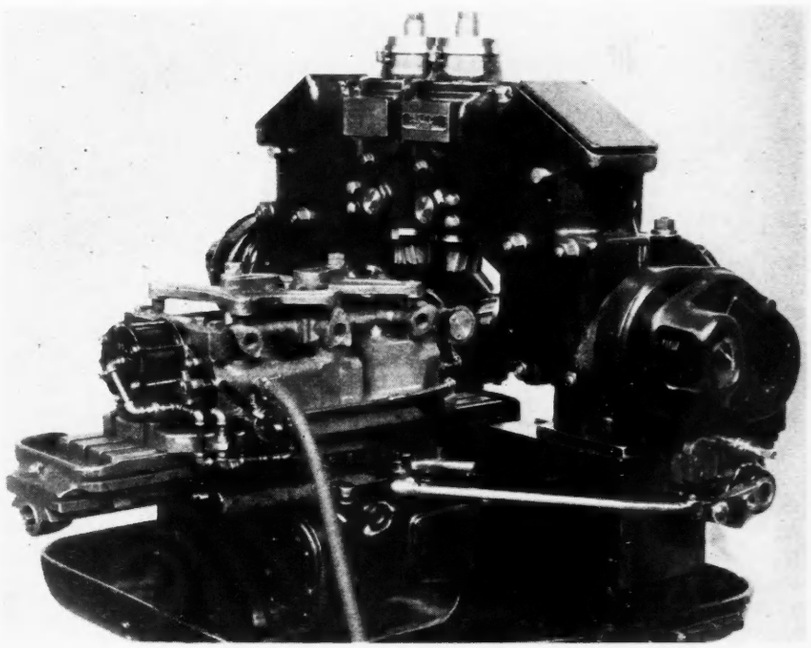
GASOLINE TYPE

Working piston displacement	112 cu. in.
Crosshead piston displacement, effective	173.1 cu. in.
Stroke	4 in.
Brake horsepower at 1500 r.p.m.	38
Cubic inches of cylinder displacement per brake horsepower	3.00
Fuel consumption per brake horsepower-hour (ordinary standard gas)	0.77 lb.
Lubricating oil per brake horsepower-hour	0.025 lb.
Weight of engine per brake horsepower (40 hp. maximum)	12 lb.
Mean effective cylinder pressure	70 lb. per sq. in.

Machining Operation

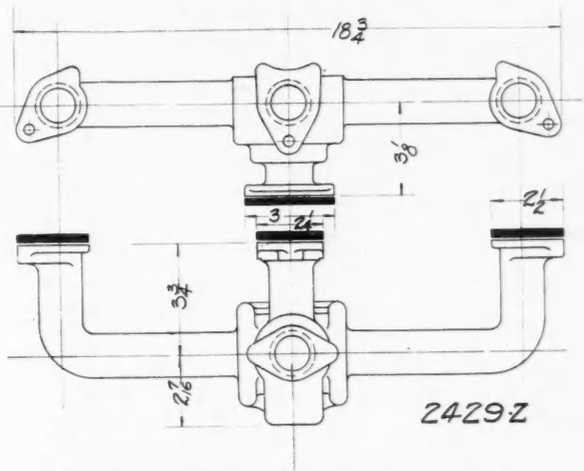
THE cylinder pads and carburetor flange of cast-iron intake manifolds are being machined by one company at the rate of 65 pieces per hour through the use of a Cincinnati 24-in. duplex automatic milling machine.

The machine has been equipped with two special spindle carriers each having one horizontal and one vertical spindle. A special air-operated fixture which holds two pieces abreast is mounted on the machine table. The rough piece rests on three fixed and one adjustable support and is located by three fixed stops. Two cone spring plungers hold the piece against the locating stops while two removable air-operated clamping members hold both pieces in position for milling.



Cincinnati duplex milling machine set up for milling intake manifolds at the rate of 65 per hr.

The work feeds past the four cutters at the rate of 8.3 in. per min., finishing two pieces at each pass of the table. Dogs automatically control the table movements and make it possible for the table to jump from one pad to the next, thus materially cutting down the time required for the operation.



Intake manifold machined with special future

About 1/8 in. of stock is removed by two 3-in. and two 3½-in. diameter shell end mills mounted on two special stub arbors. The cutters revolve at 100 r.p.m. and 88 r.p.m. Time per piece is 0.80 min.

ONE of the first results of the establishment of a separate Air Ministry in France has been the inauguration of a determined move to increase the number of airports and provide airway lighting along all the more important lines, to make night flying practicable.

First with the News

Reliable, Accurate

News of the Industry

PAGE 246 VOLUME 60 *Philadelphia, Saturday, February 16, 1929* NUMBER 7

High Schedules Indicate Record February Output

PHILADELPHIA, Feb. 16—The automobile factories probably will turn out more cars and trucks this month than in any previous February in the history of the industry. Despite the fact that a new record for January production was established last month, many companies have stepped up their schedules from 10 to 40 per cent and are now operating very close to maximum capacity.

In previous years about 6.7 per cent of the total twelve months' car and truck production has come through the factories in January and about 8 per cent in February. If output is similarly distributed in 1929, and January's total of 400,000 units is accepted as representing 6.7 per cent of the year's total, then the 8 per cent usually produced in February would amount to 495,000.

Sales conditions are reported spotty. In the Middle West the demand for motor vehicles has been comparatively poor during the last few weeks on account of unusually severe weather accompanied by much snow and ice. Better conditions have obtained in the East; sales there are reported satisfactory, although practically all of the business is confined to low and medium-priced cars. High-priced products are moving too slowly to suit many of the dealers in that field.

Reports from about 200 cities in different sections of the country show no material expansion in used car stocks.

G.M. Sales Abroad Total $264,995,500 in 1928

NEW YORK, February 12—Sales abroad in 1928 of General Motors products, including those of its subsidiary companies, the Yellow Truck & Coach Mfg. Co. and Vauxhall Motors, Ltd., totaled 290,566 units, for a value, parts and accessories, of $264,995,500, according to the annual report of J. D. Mooney, Vice-President of General Motors Corp. in charge of overseas operations and president of the General Motors Export Co. Of the cars and trucks sold, those of American design represented 47.13 per cent of the sales of all cars and trucks of American design in the overseas markets.

"The most significant evidence afforded by the economic record of 1928," the report states, "is the manifestly improved ability of the world overseas to satisfy its urge for a more extensive use of motorized transportation. Gross increases in registrations in the countries lying in the export jurisdiction are in excess of 1,200,000 cars and trucks, of which 611,219 were of American and Canadian origin, and approximately 590,000 of European origin. This rate of absorption is greater than it has ever been: the figure of American and Canadian sales shows an increase over previous years for the first time since 1925."

Duray May Drive White's Race Car

PHILADELPHIA, Feb. 14 — When J. M. White's world champion racing car, the "Triplex," is put on the track at Daytona Beach next month in an effort to better the one-mile speed record of 207.55 m.p.h. which it now holds, Leon Duray, well-known American driver, is likely to be found at the wheel.

Mr. White admitted today that Duray could have the assignment if he wanted it and friends of the driver feel certain that he will accept. Duray, who has been driving on the Pacific Coast this winter, has the reputation of being one of the most skillful and daring pilots in the racing business. During his career he has taken part in six Indianapolis Speedway classics and captured sixth place in the 1925 event. He is a product of the dirt tracks.

The present record of the "Triplex" was established last year at Daytona with Ray Keech at the controls.

Ford Has Permanent Salon

DETROIT, Feb. 11—A permanent salon has been established at the plant of the Lincoln division of the Ford Motor Co. It is intended to have at all times a well-balanced display of all Lincoln types.

To Approve Medal for Rickenbacker

WASHINGTON, Feb. 13—The House Committee on Military Affairs has unanimously agreed to report the Clancy Bill which provides for awarding the Congressional Medal of Honor to Capt. E. V. Rickenbacker, outstanding American ace and now assistant sales manager of Cadillac Motor Car Co. and president of the Indianapolis Speedway Association.

Hupp-Chandler Capacity to be 400 Units Daily

CLEVELAND, Feb. 12—This city's position in the automobile manufacturing industry has been strengthened with the announcement of expansion plans by the recently merged Hupp-Chandler interests. A program to become effective between May 15 and June 1, according to H. N. Nickerson, works manager, provides for an addition of 3500 employees at the two Cleveland plants and an increase in daily output to between 350 and 400 units.

With the stepping up of production, Mr. Nickerson said, a distinctly Hupmobile model will be manufactured. The new production level will represent an increase of from 280 to 330 finished cars over the former Chandler output of 70.

Chrysler Names Bestor

DETROIT, Feb. 12—J. E. Fields, vice-president in charge of sales, Chrysler Motors, has announced the appointment of F. C. Bestor as director of dealers' operations. Mr. Bestor for several years held a corresponding position for Dodge Brothers, after joining the sales organization of that company in 1920.

Duraleather Change Announced

PHILADELPHIA, Feb. 14—The Masland Duraleather Co. announces that distribution of Duraleather through W. & J. Sloane as selling agents will be discontinued Feb. 28. George A. Maher and Herbert R. Walton will be the direct factory representatives, with offices at 2-219 General Motors Bldg., Detroit.

Report Ford Deal for Moscow Plant

Pact With Soviet Rumored in Berlin; Officials Here Deny Knowledge

BERLIN, Feb. 13—The *Allgemeine Automobil Zeitung*, official organ of the German Automobile Club, states in a current issue that a commission of the Soviet Government has made a contract with Ford under the terms of which Ford will establish a new firm in Russia. A factory is to be located in Moscow to produce 100,000 cars per year.

Officials of the Ford Motor Co. in this country deny any knowledge of an agreement between Mr. Ford and the Soviet Government whereby the former will engage in manufacturing operations in Moscow under a Soviet concession. Questioned by a representative of *Automotive Industries* in Detroit, they stated that if such a contract is made it will be in the name of the Ford company in Great Britain, which is headed by Sir Percival Perry and was recently reorganized as an open corporation controlling all Ford activities in Europe.

The German report receives considerable credence in this country in view of the known desire of the Soviet Government to interest an American manufacturer of light cars and trucks in a Russian production plan. In a special article written for *Automotive Industries* of Dec. 29, 1928, M. Sorokin, chairman of the Soviet Automobile Trust, outlined a program for the development of automotive manufacture in Russia and said:

"We need a light type of motor car and a 1-ton truck, at present not manufactured in the country. We have therefore decided on the construction of a large automobile factory for the manufacture of these light type passenger cars and trucks, and on the enlargement of our existing factories, The new factory is to be erected in the near future, as soon as we have decided upon the type of car to be built.

"It is the general desire in Russia to select the car for this purpose in America, and we shall do so provided that we can come to terms acceptable to us with some responsible American automobile firm."

This naturally suggests Ford as the manufacturer who the Russian authorities would be most likely to approach first with their proposition, especially in view of the considerable dealings, involving heavy purchases of cars, trucks and tractors, which they have had with Ford in the past.

Detroit Sales Total 5921

DETROIT, Feb. 12—A total of 5313 new passenger cars were sold in Wayne County in January compared with 3058 in January of last year, according to the Detroit Auto Dealers Association. Ford led with 2163 deliveries. Next came Chevrolet with 971, Essex 613, Buick 171, Whippet 154, Hudson 148, Pontiac 133, Oldsmobile 128, and Graham-Paige 101.

There were 608 new commercial vehicles sold during the month compared with 232 in January, 1928. Of this number 328 were sold by Ford, 113 by Chevrolet, 40 by Dodge Brothers, 18 by Reo, 17 by Federal, 15 by International, 11 by General Motors and 11 by White. There were 14 tractors and six buses sold during the month.

Chiron Will Enter Indianapolis Race

PHILADELPHIA, Feb. 15—International rivalry is assured for the 1929 Indianapolis 500-mile race (Grand Prize of America) with the announcement here today by Louis Chiron, winner of the 1928 European championship, that he will be among the competitors.

Chiron, visiting friends in this country, is making preliminary arrangements for his debut at Indianapolis. He does not yet know what make car he will use but says it will be a foreign product.

Last year Chiron was the racing sensation of Europe. Piloting a Bugatti car, he won in succession the Grand Prix of Rome, the Grand Prix of the Marne, the San Sebastian Grand Prix, the Spanish Grand Prix and the European Grand Prix at Monza. He also took first honors in the Grand Prix of Monte Carlo and placed well to the front in the Targa Florio Cup race in Sicily.

In the San Sebastian Grand Prix Chiron drove the fastest race ever run over the famous Lasarte Circuit, averaging over 80 m.p.h. and making a record of 88 m.p.h. for a single lap.

New Studebaker Announced

SOUTH BEND, Feb. 13—Announcement of a new seven-passenger President Eight sedan has been made by the Studebaker Corp. of America. The car, which is mounted on a 135-in. chassis, has a 115 hp. President Eight engine and is listed at $2,350 at the factory, including six wire wheels and luggage grid.

Gardner Adds Brougham

ST. LOUIS, Feb. 13—Addition of a sport brougham in the 130 series, is announced by the Gardner Motor Co., Inc. The new model, which is priced at $2,410 f.o.b. St. Louis, is powered by the same Lycoming 115 hp. engine as is used in other models of this series, but new coachwork, finish, and several new points of external design are apparent.

Aviation Committee Appointed

NEW YORK, Feb. 11—National Fire Protection Association has appointed a special committee on aviation, under the chairmanship of Samuel D. McComb, for the guidance of aircraft builders.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

NEW YORK, Feb. 14—The weather has not been so severe during the last week, and trade in general has been fairly good. Although some lines have experienced disappointment, general business activity so far this year has been high, and there is no excess speculation apparent in any of the commodity markets.

FREIGHT CAR LOADINGS

Car loadings for the week ended Jan. 26 totaled 926,188 cars, which represents an increase of 23,524 cars over those in the corresponding week in 1928, but a decrease of 17,691 under those in the corresponding week in 1927. Car loadings during the four weeks in January totaled 3,570,978, as compared with 3,448,895 during Jan. 1928, and 3,756,660 during Jan., 1927.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended Feb. 9 stood at 97.1 and compares with 97.7 the week before and 97.2 two weeks before.

BANK DEBITS

Bank debits to indivdual accounts outside of New York City for the week ended Feb. 6 were 23 per cent above those in the similar week last year.

STOCK MARKET

The simultaneous announcement of the advance in the rediscount rate of the Bank of England to 5½ per cent and the warning issued by the Federal Reserve Board to the member banks regarding undue use of bank credit for security speculation caused a severe break in the stock market on Thursday, with a further decline in prices on Friday. Call money ranged from 6 to 9 per cent durng the week.

BROKERS' LOANS

Brokers' loans in New York City for the week ended Feb. 6 showed an increase of $110,000,000, reaching an aggregate of $5,669,000,000, a new high record for all time. The expansion in call loans placed for private corporations and individuals during that week was much less than has been the case in recent weeks.

FEDERAL RESERVE REPORT

The consolidated statement of the Federal Reserve banks for the week ended Feb. 6 showed an increase of $31,000,000 in holdings of discounted bills, although there was a decrease in this item of $17,800,000 in the New York district. There were decreases of $24,900,000 in bills bought in the open market, of $1,700,000 in holdings of Government securities and of $4,700,000 in member bank reserve deposits. The reserve ratio on Feb. 6 was 69.3 per cent, as compared with 69.4 a week earlier.

Janeway Talks on Higher Compression

Points Out Possibility of 6 to 1 on Standard Fuel, Before S. A. E.

DETROIT, Feb. 12—The possibility of using compression ratios in the neighborhood of 6 to 1 on standard fuel, without objectionable effects and without sacrifice in output, was pointed out in a paper read before the S.A.E. Detroit Section by Robert N. Janeway last night. Mr. Janeway showed that the two principal barriers to increased compression, detonation and shock (roughness), are subject to control.

High speed "miss" and low speed "popping," prevalent especially in eight-cylinder engines, are due, according to Mr. Janeway, to unequal distribution and to dilution of the charge around the plug by exhaust gas, whereby the rate of combustion is so slowed down that combustion is not completed when the exhaust valve opens.

In the discussion, Prof. G. B. Upton of Cornell University stated that the results obtained and theory derived by Mr. Janeway closely checked his own investigations along these lines, especially as to the dependence of roughness on the acceleration rate of pressure rise in the combustion chamber.

In answer to a question by F. F. Kishline, as to why supercharging increased detonation, Mr. Janeway stated that this was not due to the pressure rise but to the higher temperature of the incoming gases and resultant higher temperature of unburnt fuel during combustion.

Arthur W. Pope, Jr., of Waukesha Motor Co., did not agree with Mr. Janeway that turbulence as affected by combustion chamber design was a minor consideration. On the other hand, Alex Taub, of the Chevrolet Motor Co., pointed out that the combustion chamber of the new Chevrolet engine, with its tortuous passages, decreased the chance for turbulence and yet this engine had a higher compression ratio than would generally be considered practicable with a valve-in-head engine.

Thompson Reports Buying Two Cleveland Companies

CLEVELAND, Feb. 13—Thompson Products, Inc., has announced its purchase of the Cleveland Piston & Mfg. Company and the Cox Tool Company here. Stockholders of the Thompson company have approved the purchase, which was for cash.

The company also makes announcemennt of a $725,000 building program in Cleveland and Detroit, including the erection of a four-story addition to the present unit, which houses the executive offices. The first three floors will be for manufacturing and the fourth for offices. The Detroit unit will cost about $350,000.

Conference Opposes Aircraft Fuel Tax

NEW YORK, Feb. 12—Gasoline for use in aircraft should be exempt from taxes, in the opinion of the New York State Aviation Conference. According to a resolution adopted by the conference, the purpose of gasoline taxes is for construction and maintenance of highways and inasmuch as aircraft do not use the highways they should not be taxed for such purposes.

New Willys Factory Capacity 150 Daily

LOS ANGELES, Feb. 13—The new manufacturing plant of the Willys-Overland Co., which was put into operation following its formal opening by John N. Willys last week, has a capacity of 150 cars daily with employment of from 800 to 1000 operators on the day shift. This capacity can be increased by operating the plant at night.

The site occupied by the four buildings, which is eight miles from the center of the city, is 20 acres in area and the floor space aggregates approximately 300,000 sq. ft. The main building, one story in height, is provided with docks, railroad tracks and has a total floor space of 227,200 sq. ft. An oil house, boiler house and engine room with an additional 7400 sq. ft. make up the rest of the plant.

Among officials of the Toledo company who attended the opening ceremony with Mr. Willys were: A. B. Qualy, secretary; L. A. Miller, first vice-president; Colin Campbell, vice-president in charge of sales; J. A. Sheldon, works manager, and W. H. Curand, works engineer. Distributors and dealers were headed by R. L. Butler, in charge of the company's Los Angeles zone.

American Eagle to Make New Radial Engine Soon

KANSAS CITY, Feb. 13—The American Eagle Aircraft Corp. contemplates production of Hudson Hawk engines, to which it recently purchased the manufacturing rights, within a short time, according to E. E. Porterfield, Jr., president. The engine is a six-cylinder radial air-cooled type.

Mr. Porterfield explained also that the company has contracted for 200 Wright Whirlwind engines, 300 Kinner engines, and has on hand 190 OX-5 and 33 Hispano-Suiza engines.

Servel, Inc., Earns $236,398

NEW YORK, Feb. 12—Servel, Inc., reports net profit for 1928 as $236,398, after charges, equal to $5.52 a share on 42,800 preferred shares outstanding.

Ford By-Products Reach Huge Figure

Coal Tar, Benzol, Gas, Glass, Chemicals Among Items Yielded

DETROIT, Feb. 12—By-products of the Ford Motor Co. reached enormous proportions in 1928, according to statistics recently released by the company. From the coking process of coal alone was produced the following: 13,552,394 gal. of coal tar, 17,238 tons of ammonium sulphate, 13,661,995 gal. of motor benzol, 16,845,232,000 cubic feet of gas and 1,101,689 tons of coke.

The coal tar was burned as fuel; the ammonium sulphate sold for fertilizer; thousands of motorists bought Ford benzol in Detroit. The company consumed part of the gas, the rest being disposed of to a Detroit gas company. The coke was consumed or sold.

By-products derived from the northern Michigan hardwood lumbering district comprised, in part: 15,898 tons of charcoal briquets, 2,827,237 lb. of hardwood pitch, 197,406 gal. of wood alcohol (known under the trade name of CP Methanol), 853 tons calcium acetate, 550,408 gal. ethyl acetate. By-products in the Rouge plant include: 620,075 barrels Portland cement, 283,210 net tons of slag (used in the manufacture of Portland cement and for grading roads).

During 1928, 14,155,507 sq. ft. of plate glass was manufactured as follows: Rouge 5,399,773 sq. ft. Twin Cities 2,240,526 sq. ft. Glassmere 6,515,208 sq. ft. The paper production for the same period amounted to 4443½ tons. Rouge produced 304,191 gross tons of pig iron in the blast furnaces and 321,476 gross tons of ingots in the open hearth. A total of 2,884,-728 tons of coal was mined in 1928.

Schedule 11,000 Oldsmobiles

DETROIT, Feb. 11—Olds Motor Works have scheduled 11,000 vehicles during the 22 working days of February or an average of 500 cars daily. This will be a new factory record. January production totaled 6500 compared with 1628 in January, last year.

Urge Uniform Traffic

WASHINGTON, Feb. 14—The Governing Board of the Pan-American Union has adopted a resolution requesting the consideration of a system of uniform traffic regulations for all nations of the Western Hemisphere at the Second Pan-American Congress of Highways which will convene at Rio de Janeiro next August.

Hudson Schedules 35,000

DETROIT, Feb. 11—Hudson Motor Car Co. shipped 27,527 Hudson-Essex cars in January. This compares with 25,390 in January last year. February schedule calls for 35,000 cars.

Penna. Bill Would Remove Speed Limit

Also Increases License Fees and Creates "Certificates of Junk"

HARRISBURG, PA., Feb. 14—All speed limits on the open highway in Pennsylvania will be abolished if a bill now before the legislature is approved. The present law limits passenger car speed to 35 m.p.h. The new bill also raises drivers' licenses from $1 to $2 a year and fees for licenses of commercial vehicles and buses are materially raised, in one case as much as 125 per cent. This applies to buses with solid tires. The rises on buses with pneumatic tires is 100 per cent. No increase is made in fees on private cars.

Official brake testing stations are created, and upon proclamation by the Governor automobile inspection becomes compulsory. Eventually the Highway Department will seek legislation that any owner unable to show a certificate of inspection for his car will be unable to obtain a motor license.

"Certificates of junk" would be issued for cars sold as such, and no certificates of title would be issued for any car thus classified. The bill also provides arrest and fine for hitch hikers.

It is believed that before adjourning, the legislature will approve an increase in the gasoline tax, raising it to four cents from the present three-cent rate.

Bradfield Motors Adding to Capital and Products

CHICAGO, Feb. 12—Bradfield Motors, Inc., with headquarters here and a plant at Hartford, Wis., has increased its capitalization from $25,000 to $1,000,000. The company was organized last July and has held a small capital during its development period. Heretofore the company has been developing and building taxicabs, but it will also start immediately in the production of trucks for sale to truck rental operators.

The company is headed by H. C. Bradfield, Elmer G. Knox and George H. Daubner, all of whom have been identified for some years with the taxicab industry. The new capital will consist of 10,000 shares of preferred stock of $50 par value and 100,000 shares of common stock of $5 par value. All of this stock has been sold privately.

U. M. Station is Opened

DETROIT, Feb. 12—United Motors Service has opened its new service station in the newly constructed General Motors Research Building, extending an entire block between Baltimore and Milwaukee avenues and with entrances at each end. United Motors is occupying space on three floors in the building, the second and third floors housing offices and providing room for stock of genuine parts for the specialized automotive equipment which the company handles nationally. The space on the ground floor has been divided into separate sections for the servicing of electrical equipment, batteries, radiators, speedometers, shock absorbers and oil filters.

Lammot du Pont
Whose election as chairman of the board, General Motors Corp., was announced in Automotive Industries last week

Gemmer is Making Deliveries to Ford

DETROIT, Feb. 13—Gemmer Mfg. Co. has started delivery of the first steering gears on its contract with the Ford Motor Co., according to Edward P. Hammond, president of Gemmer. The present supply is being absorbed by the Highland Park plant, but later Gemmer steering gears will be going to all Ford branches.

Gemmer expects to be delivering 2000 units a day to Ford by March 1. As a result of the addition of this Ford business Gemmer expects to manufacture approximately 600,000 steering gears in the first half of the year.

"We base this estimate on new business signed up during 1928 and thus far in 1929 while such an output would be only twenty per cent below the total of approximately 750,000 units delivered during all of last year," said Mr. Hammond. "This indicates an exceptionally prosperous year for the company in 1929 as both production and earnings of Gemmer last year exceeded all previous records."

Willys Appoints Beardsley

BUFFALO, Feb. 11—Appointment of Nelson A. Beardsley as general sales manager of the Willys-Knight division of Willys-Overland, Inc. was announced today. Mr. Beardsley had been Willys-Overland Eastern regional manager.

Electrical Firms Being Consolidated

Square D. and Industrial Controller Companies Are to Combine Activities

DETROIT, Feb. 13—Square D. Co. of Detroit and Industrial Controller Co. of Milwaukee, two outstanding manufacturers of electric switches panel board and other electrical controlling devices, are being consolidated, according to T. J. Kauffman, president of the Detroit concern, who is to be president of the new company.

The merger will be effected both by means of cash and stock transfer, Mr. Kauffman announced. The capital of Square D. Co. is to be increased by 15,751 units, consisting of one share of Class A and one-half share of Class B stock, and by the issuance of approximately $800,000 of debentures. It is expected that Industrial Controller business will add about $1,250,000 to the annual output of Square D.

The officers of the new company, besides Mr. Kauffman, will include: Carlton M. Higbie, F. W. Magin and L. W. Mercer as vice-presidents and W. S. Worcester as secretary and treasurer. Mr. Mercer and Mr. Magin will represent the Industrial Controller management in the new executive personnel.

Pierce-Arrow Announces Its New General Manager

BUFFALO, Feb. 11—George E. Willis, vice-president in charge of sales of Pierce-Arrow Motor Car Co., has announced the appointment of D. J. Willoughby as general manager of the company.

Mr. Willoughby was formerly traveling representative for Studebaker and later managed branches for that company in Boston and South Bend. More recently he was president of Studebaker's subsidiary company operating branches in the Middle West and South.

Baldwin Plant to be Garage

PHILADELPHIA, Feb. 13—A building that for half a century has been the scene of locomotive construction will soon become one of the largest automobile garages in the country. It is a part of the site in the center of the city formerly occupied and still owned by the Baldwin Locomotive Works, in which the Fisher Brothers of Detroit are heavily interested. The garage to be opened by the lessee will have space for 1500 cars.

Pease Co. Opens New Office

CHICAGO, Feb. 11—C. F. Pease Co., manufacturer of blueprint machinery and supplies, has established a new sales office at 501 South Spring Street, Los Angeles, under the direction of Ralph S. Gibson, western sales manager.

Men of the Industry and What They Are Doing

Valentine & Co. Elects Pulsifers and Phillips

Valentine & Co. at its recent annual meeting elected the following officers: Chairman of the executive committee, N. T. Pulsifer; chairman of the board, A. L. Phillips; president, Lawson Valentine Pulsifer; executive vice-president, O. A. Hasse; vice-president, Langdon B. Valentine; vice-president and treasurer, Lawrence Phillips; assistant treasurer, L. H. Roper; and secretary, L. A. Osborne.

N. T. Pulsifer, newly elected chairman of the executive committee, was vice-president of the company from 1902 to 1915 and president from 1915 to 1922, and chairman of the board of directors from 1922 to this last meeting. Mr. Phillips, newly elected chairman of the board, has been with the company 38 years.

Brand Elected Director

W. H. Brand, vice-president of the First Wisconsin Co., has been elected a director of the Interstate Drop Forge Co., Milwaukee. The company is a part of an affiliated group consisting of the Chain Belt Co., Federal Malleable Co. and Sivyer Steel Castings Co.

Kinner Elects Holley

G. M. Holley, president of Holley Carburetor Co. and of Towle Marine Airplane Co. and a director of Stinson Aircraft Co., all of Detroit, has been elected a director of Kinner Airplane & Motor Corp. of Glendale, Cal.

Koral Joins Ala Mfg. Co.

B. J. Koral has severed his connections as vice-president, director and sales manager of E. Edelmann Co., Chicago, and is now vice-president of Ala Mfg. Co., Chicago, manufacturer of battery hydrometers.

Seymour General Manager

Capt. Lester D. Seymour, chief engineer, has been promoted to general manager of the National Air Transport, Inc. Col. Paul Henderson, formerly general manager, remains as executive vice-president.

Weaver and Sands on Voyage

Chester N. Weaver, Studebaker distributor for San Francisco, and P. E. Sands, president of the Sands Motor Co., Studebaker distributor for Seattle, have sailed for the Hawaiian Islands where they will spend a few weeks' vacation.

Wilkinson Succeeds Gane

F. W. Gane has resigned as representative for Blackhawk Mfg. Co., Milwaukee, maker of socket and open end wrenches and hydraulic jacks, in Michigan, eastern Ohio, northern West Virginia and western Pennsylvania, and has been succeeded by George Wilkinson, who has been a district manager for the company during the past year.

Walter R. Breeler

New head of chemical and metallurgical departments of Whitman Barnes-Detroit Corp.

Universal Elects Dunwoody

Col. Halsey Dunwoody, formerly assistant chief of the A.E.F Air Service, and member of the Interallied Aviation Commission, has been elected executive vice-president in charge of all operations of the Universal Aviation Corp., large airline systems.

Esser Becomes Sales Manager

Standard Battery & Electric Co., distributors of automotive accessories and shop equipment in eastern Iowa, has announced the appointment of J. G. Esser, formerly of Minneapolis, as sales manager, a newly created post in the organization.

LaBastille Visiting Auburn

F. M. LaBastille, representative for Auburn in South America, has returned to this country after two years' absence and will spend several weeks at the factory at Auburn, Ind.

C. I. T. Appoints Hildebrandt

Commercial Investment Trust, Inc., has appointed Thomas T. Hildebrandt as manager of its recently organized aeronautical division. Mr. Hildebrandt, a veteran aviator, has represented the National Aeronautical Association as an official at a number of events at various flying clubs.

Bump Succeeds Marshall as Larrabee-Deyo Head

F. R. Bump was elected president of the Larrabee-Deyo Truck Co., Binghamton, N. Y., succeeding S. J. Marshall, who accepted the presidency a year ago to aid in reorganizing the company. Mr. Bump served as vice-president and general manager during the last year.

Harry Richards succeeds Mr. Bump as vice-president. The company manufactured more than 500 trucks last year, and officers expect to double this number during 1929. The plant is behind in production, having orders on hand for more than 100 trucks, according to Mr. Marshall.

Yerger to Have New Post

Hanson-Van Winkle-Munning Co., which produces electroplating and polishing equipment and supplies, has announced the appointment of C. W. Yerger, eastern district manager of Cutler-Hammer Mfg. Co., as its sales manager, effective March 4.

Balbridge Joins Addison

A. D. Balbridge, formerly general manager of the T. & H. Motor Co., and of the Thomas-Hunt Packard Co., both of Greensboro, N. C., has been elected vice-president and general manager of Addison Service, Inc., of Charlotte, N. C. He has assumed his new duties.

Richardson Ends Eastern Trip

W. J. Richardson, vice-president of the Chester N. Weaver Co., Studebaker distributor for San Francisco, returned to that city with Mrs. Richardson after a six weeks' trip to New York.

New Company Names Russell

Curtiss Caproni Co., recently organized for the manufacture of Caproni airplanes in this country, has elected Frank H. Russell vice-president and chief engineer of the Curtiss Aeroplane & Motor Co., as president. C. M. Keys is chairman of the executive committee and Gianni Caproni is chairman of the board of directors.

Fickes and Neilson Elected

E. S. Fickes, of Pittsburgh, vice-president in charge of engineering of the Aluminum Co. of America, has been elected a director of the firm. W. C. Neilson, of Philadelphia, has been made a vice-president.

Elliot Wins Promotion

W. A. Elliot, zone sales manager for Willys-Knight at St. Louis has been promoted to sales manager for the Southwest territory. His headquarters will be at Kansas City.

C. G. Spring-Biflex Stocks Are Offered

New Company to Have Authorized Capital of 290,000 Shares

DETROIT, Feb. 12—Units of stock in the new company formed through the sale of assets of the C. G. Spring & Bumper Co. and the acquisition of controlling interest in the Biflex Products Co., announced recently in *Automotive Industries*, are offered for sale at $66 each. The units consist of Class A no par value convertible preferred stock and one share of Class B no par value common.

Stockholders of C. G. Spring & Bumper, who ratified the sale of assets to Harris & Small, Detroit bankers, on Feb. 8, have been offered the right to subscribe to the new stock. The corporation, which has been named General Spring Bumper Corp., is to have an outstanding capitalization, upon completion of C. G. Spring & Bumper assets, of 69,500 shares of Class A and 89,500 shares of Class B stock. Authorized capital consists of 90,000 shares of Class A and 200,000 shares of Class B, the latter figure including an amount sufficient to provide for the conversion of Class A into Class B.

Liquidation of the spring company under the plan involves the redemption of the company's outstanding first mortgage bonds, debentures and preferred stock. Preferred stockholders are to receive the call price of $11 per share, plus accured dividends. Common stockholders are to receive $12 per share. Claire L. Barnes, president of the newly organized Houdaille-Hershey Corp. and of the Oakes Products Corp., is to head the new company.

Gabriel Snubber Devotes Earnings to New Product

CLEVELAND, Feb. 13—Gabriel Snubber Mfg. Co. provided for the entire cost of development of its new triple hydraulic shock absorber in 1928, including machinery, tools and equipment required for its production, out of 1928 net profits of $327,976, G. H. Ralls, president of the company, reported to the stockholders.

No dividends were paid by the company during the year because of the directors' desire to direct the resources toward the development of the new product. The report lists current assets at $1,899,594 and current liabilities at $241,920. The largest item of current assets consists of Government securities carried on the books at cost price, $1,642,461, and reflecting an increase of $136,023 over such assets in 1927.

Pollack Orders, $75,000

NEW YORK, Feb. 11—Pollack Mfg. Co., reports unfilled orders, mainly from aviation manufacturers, amounting to about $75,000. The orders include a quantity of manifold and nose cowls for the Wright Aeronautical Corp. for its J6 engine. Other orders have been received from Fairchild, Fokker, Ford, Consolidated Aircraft and Consolidated Instrument Co. An order for the largest aluminum gas tank ever built has been received from the Ballanca Aircraft Corp. for a special long distance plane.

Deny Budd Merger Rumor After Stock Takes Rise

DETROIT, Feb. 14—Rumors, arising from market activities in its stock, that the E. G. Budd Mfg. Co., or its subsidiary, the Budd Wheel Co., was involved in a pending merger with other prominent automotive interests was denied here today by E. A. Clark, a member of the company's Detroit executive staff.

The rumor cropped up yesterday in financial circles following heavy trading and a rise of 10 points in Budd wheel on the Philadelphia Stock Exchange. During the day 27,000 shares changed hands and the stock closed at 89¼ from a low of 81. Stock of the E. G. Budd Mfg. Co. also was active during the day both in Philadelphia and on the New York Curb and registered a five-point gain.

Mr. Clark in denying the rumor that a prominent automobile company was seeking control explained the heavy turnover of stock as merely reflecting sudden public interest resulting from recent large earnings of the Budd companies.

Auburn Dividends $1,282,000

AUBURN, IND., Feb. 12—Auburn Automobile Co. has paid during the approximate four-year period ending Nov. 30, 1928, more than $1,282,000 in cash dividends, equal to more than the combined par value of the preferred and common stocks outstanding at the beginning of that period, according to E. L. Cord, president. Surplus available for dividends has increased more than $1,975,000 after charging off good will in amount of $634,027.10. Of the outstanding common stock as of Nov. 30, 1928, aggregating 141,450 shares of no par value, 47,991 shares have been issued as stock dividends. Net tangible book value for shares of stock outstanding increased from $52.89 at Jan. 1, 1924, to $69.42 Nov. 30, 1928.

Form Union Air Terminal

CLEVELAND, Feb. 11—Four airplane operating companies, working out of this city, have cooperated in establishing a joint union air terminal. Included is the provision of a downtown ticket office which includes a waiting room and information bureau, and from which bus service connections are provided with the municipal airport. The cooperating companies are: Stout Air Lines, Inc.; National Air Transport, Inc.; Dungan Aircraft Co. and the U. S. Airplanes Co.

Financial Notes

Johns-Manville Corp. reports net profit for 1928 after all charges as $5,589,398. This is equivalent to $6.75 a share on common stock and compares with earnings of $4,108,159 for 1927, an increase of 36 per cent.

Stinson Aircraft Corp. reports a net income of $127,723 for its 1928 operations. This is at a rate of $1.63 per share on the 123,780 shares of no par common stock issued and outstanding and compares with $22,560 for 1927.

Timken Detroit Axle Co. has declared regular quarterly dividend on preferred stock of 1¾ per cent payable March 1 to holders of record Feb. 20.

Bohn Aluminum & Brass Corp. and subsidiaries report net profit for 1928 as $3,180,423 after all charges. This is equivalent to $9.09 a share on 350,000 no par shares and compares with earnings of $1,181,606 or $3.28 a share in 1927.

Curtiss Assets Corp. has declared payment of $10 a share on certificates of beneficial interest and Curtiss Aeroplane and Motor Co. has declared 50 cents semi-annual dividend, both payable March 15 to holders of record Feb. 28.

Commercial Credit Co. reports net profit for 1928 after all charges as $4,132,391. This is equivalent to $4.01 a share on average common stock outstanding for the year and compares with net earnings of $2,067,888, or $1.05 a share, on average common stock outstanding for the previous year.

Federal Mogul Corp. reports net earnings for 1928 as $455,962.99, equal to $3.50 per share on the 130,000 shares of common stock outstanding, almost three times the annual dividend requirement of $1.20. January, 1929, was the best month in the company's history, according to officials.

Grand Rapids Metalcraft Corp. reports net earnings for 1928 of $211,308 against $132,797 for 1927. Current assets at the close of the year totaled $496,169 against current liabilities of $143,026. Total assets were $571,194.

Muncie Gear Co. reports consolidated net earnings for the year 1928 as $228,506 after all charges including depreciation, Federal taxes and certain non-recurring charges amounting to $22,110. These earnings are equal to $6.09 a share on the 37,500 shares of Class A stock and $2.72 a share on the 56,250 shares of common stock after allowing for the annual dividend on the A. Earnings in 1927 were $92,509 after the above charges, equal to $2.46 a share on the A and 31 cents on the common.

Ross Gear & Tool Co. reports net income for 1928 as $751,351 after all charges, equal to $5.01 a share on common as against $403,576 or $2.65 a share the preceding year.

Caterpillar Tractor Co. reports net sales for 1928 as $35,071,600 as compared with $26,928,088 for 1927. Net profit before Federal taxes was $9,295,639 as against $6,910,326 for the previous year. An increased quarterly dividend of 75 cents was declared payable Feb. 25 to holders of record Feb. 15.

Earnings of Six Car Producers Show Increase of 19% in 1928

DETROIT, Feb. 15—Such annual statements of passenger car companies as are thus far available show, in the aggregate, a large increase in net earnings for 1928 over 1927.

Not only did the year set a new record for vehicle production, but it is almost certain that a record also was established for net earnings for the industry as a whole, although that cannot be determined definitely until the statements of all companies are made available.

Up to the present time earnings have been announced by six prominent producers. The combined production of these six companies represents 45.2 per cent of the industry's total. Among them is General Motors Corporation.

Taken together, the net earnings reported by these six producers for 1928 exceed by 19 per cent the net earnings of the same companies for 1927. Excluding General Motors, whose individual earnings were 17.6 per cent higher in 1928 than in 1927, it is found that the other five companies lumped together show an increase in profits of 24 per cent.

Three of the five companies suffered slight declines in earnings, but the gains registered by the remaining two were phenomenal, one topping its 1927 figure by 212.5 per cent and the other by 86.4 per cent.

The figures are as follows:

NET EARNINGS

Company	1928	1927	Per Cent Gain or Loss
General Motors	$276,468,108	$235,104,826	+ 17.6
Hupp	8,500,000*	2,719,000	+212.5
Packard	21,885,400	11,743,500	+ 86.4
Nash	20,820,085	22,719,000	− 8.0
Hudson	13,457,364	14,431,000	− 6.7
Auburn	1,133,459	1,278,533	− 11.3
Total	$342,244,416	$287,947,603	+ 19.0
Total with Gen'l Motors excluded	$65,776,308	$52,842,777	+ 24.0

* Last quarter estimated.

Beauty Show Ban Proves Unpopular

WASHINGTON, Feb. 12—The recent decision of the Society of Motor Manufacturers and Traders, Ltd., prohibiting members from taking part in rallies and motor "Beauty Shows" in Great Britain is proving extremely unpopular in some quarters, an announcement by the Department of Commerce this week states. The organization controls all exhibitions in Great Britain and the decision was based upon the ground that rallies, which have been successful on the Continent, might eventually detract from the established Olympia Annual Motor Show and the Annual Scottish Show at Glasgow.

Automotive Leaders Pay Tribute to Edwin Denby

DETROIT, Feb. 11—Public officials of the state and nation, as well as leaders in the automotive industry, paid tribute to Edwin Denby, former Secretary of the Navy, whose funeral was held today from Christ Episcopal Church. Mr. Denby, who was 59 years old, died in his home here Feb. 8, the victim of a heart attack. He leaves a widow and two children.

His connection in the automotive field began in 1909 when he joined Hupp Motor Car Corp. and became its treasurer. In 1914 he organized the Denby Motor Truck Corp., with Garvin Denby, and became its first president. He was succeeded as president in 1920 by A. S. More but remained a director and vice-president. He was also one of the organizers of the Federal Motor Truck Co. and of the National Bank of Commerce.

Institute Announces Plan for Consulting Service

CLEVELAND, Feb. 12—A new plan of shop practice consulting service has been inaugurated by the Malleable Iron Research Institute, with J. B. Deisher of Rochester, N. Y., in charge. The work is to include advice to member companies upon all phases of melting furnace and annealing oven practices and of molding practices including the gating and feeding of castings to insure soundness.

Sectional shop practice meetings of shop men also will be held under the direction of Mr. Deisher for discussion of shop problems of general interest. There will be a widening of the institute's activity in issuing certificates assuring integrity of castings among member concerns. Such certificates will continue to be issued quarterly.

Undertake Five-Year Research

NEW YORK, Feb. 12—The Engineering Foundation has announced a five-year project for fundamental research in iron alloys in which all available material on the subject is to be coordinated in a series of monographs and manuals. The sum of $150,000 is to be devoted to this work which will be directed by a committee headed by John Johnson, director of research and technology of the United States Steel Corp.

Minnesota Group Elects

MINNEAPOLIS, Feb. 12—A. M. Benson was reelected secretary of the Minnesota Motor Trades Association at the annual meeting in Minneapolis. A. O. Watland of Albert Lea was made president, W. W. Walwork of Moorhead, vice-president, and G. M. Craig of Minneapolis, treasurer. Thirty-two directors were elected to represent the different sections.

Edison Outlines Work on Substitute for Rubber

FORT MEYERS, FLA., Feb. 11—Thomas A. Edison told President-elect Hoover, who felicitated him on his eighty-second birthday today, that he believed the solution to the rubber problem, toward which he is devoting the latter years of his life, lay in the cultivation of certain plants yielding the substance in this country. He said there were more than 1200 such plants of which at least 40 were worth cultivating on a large scale.

The solution yet to be reached is the perfection of a machine for removing the rubber fluid from the plant, a machine as efficient and simple as a milk separator. Mr. Edison had previously emphasized that it is not his desire to supplant entirely the rubber tree in the world's production system, believing that the farmers of this country can produce plenty of other things in times when an outside rubber monopoly is not imminent. Among those who joined in the celebration of the inventor's birthday were Henry Ford and Harvey S. Firestone.

Ford Gives $5,000,000

NEW YORK, Feb. 11—A $5,000,000 endowment by Henry Ford for the Edison Institute of Technology, Dearborn, Mich., was announced today at the luncheon of Edison pioneers at the Astor in celebration of the eighty-second birthday of Thomas A. Edison. The communication from Mr. Ford indicated that other large gifts to the institute, which he operates in conjunction with his Museum of American Industries, would be made later.

Pennsylvania Tax $22,508,826

HARRISBURG, PA., Feb. 11—Gasoline tax collections during 1928 totaled $22,508,826.37, State Treasurer Samuel S. Lewis has announced. It represented consumption of 753,027,312 gal.

M. & E. A. Begins Plans for Exhibit

New Products to be Presented at Annual Event in Fall

NEW YORK, Feb. 14—Manufacturing members of the Motor & Equipment Association are developing plans for a number of new products to be presented at the annual business exhibit or wholesale trade show to be held in the Coliseum, Chicago, Nov. 4-9 inclusive. This show will be the first held under the M. & E.A. name and will be the successor of the Automotive Equipment Association business exhibit held every fall for the past ten years.

During the period of the show and the accompanying annual exhibit, the M. & E.A. will have headquarters established at the Stevens Hotel, arrangements for which have just been completed by N. H. Boynton of the National Lamp works, president of the M. & E.A.

The show itself will be held in the Coliseum as it has heretofore. Officers and committees of the association are working on plans to encourage all possible contacts between the principal executives of manufacturing and wholesale houses and to stimulate thorough inspection of the products on exhibits at this show.

Builder of "Golden Arrow" Says 240 Miles Possible

NEW YORK, Feb. 11—Calculating the head resistance and the power of the "Golden Arrow," Maj. Segrave should be able to travel 240 m.p.h. when he attempts to lower the present speed record at Daytona Beach, next month, in the opinion of Capt. John S. Irving, designer and builder of the car. Captain Irving is chief engineer of the Humfrey Landberg (Sales) Ltd., of London.

Asked what features of the car might be considered as contributing to possible developments in the commercial automobile field, Captain Irving stated that the special clutch augmented with its vacuum booster would probably come into use, especially in the higher priced cars, before long. The double propeller shaft he thought might be employed in heavy-duty commercial vehicles but he said that it would be impracticable for average passenger cars.

Major Segrave and his party have left for Daytona where the beach has been reserved for his use the week of March 1-7.

Warner Aircraft Building

DETROIT, Feb. 12—The Warner Aircraft Corp., manufacturers of airplanes, has purchased a six-acre site, near Seven Mile Road and Grand Trunk Railway, on which it has started construction of a $150,000 one-story factory, 100 ft. by 280 ft.

King George Chooses Business Man's Home

LONDON, Feb. 11—In the selection by King George of Craigweil House, Bognor, Sussex, as a temporary retreat, it is revealed that for the second time within two months the residence of an industrial leader connected with the automotive field has been chosen by a nation's head. Craigweil House is the property of Sir Arthur du Cros, president of the Dunlop Rubber Co. President Coolidge selected the residence of Howard E. Coffin, vice-president of Hudson Motor Car Co., on Sapelo Island, near Savannah, Ga., at which to spend his Christmas holiday.

Year's Tire Exports Drop to $41,203,869

WASHINGTON, Feb. 14—Exports of automobile tires during 1928 had a total value of $41,203,869, or $4,169,665 less than the total value of the preceding year's shipments, according to a report made public this week by the Department of Commerce.

The decline, which was anticipated by the trade, was due principally to cheaper crude rubber, the overstocked market at the close of 1927, and keener foreign competition, observes the department. Only two—solid and pneumatic tires—of the six classes of automotive rubber products registered volume declines, it was noted.

The difference in trade of automobile casings during 1927 and 1928 was nearly $2,845,000 in value and 118,262 in units. Solid tires declined 39 per cent in value and 34 per cent in volume. Inner tubes exports increased in volume but decreased slightly in value, while exports of miscellaneous casings and tubes showed a very slight increase in volume but an 18 per cent decrease in value. Exports of miscellaneous solid tires also increased in volume but decreased 8 per cent in value. Exports of tire repair materials declined 8 per cent in value.

Crude Rubber Declines

NEW YORK, Feb. 11—Prices in crude rubber weakened slightly last week, according to F. R. Henderson Corp., but levels are still above those at the close of the year. Arrivals at the United States for the first week of February are estimated at 28,850 tons with probable arrivals for the month at 62,500. Stocks in London increased to 25,389 tons. Shipments during January from Malaya were 52,546 tons as compared with 34,946 for January a year ago and with 66,763 for December.

A.A.A. Gives List of Tax Deductions

Bureau Permits Several Items for Car Operation in Filing Returns

WASHINGTON, Feb. 16 — Deductions from the gross income allowed under the regulations of the Bureau of Internal Revenue on account of automobile ownership and operations were outlined by the American Automobile Association today. The list of allowable deductions follow:

1. All sums paid during the calendar year in the form of registration fees, drivers' licenses, state personal property taxes and municipal taxes.
2. Gasoline tax in all cases where it is a "consumers' tax" under the state law.
3. Interest on money borrowed for the purchase of an automobile irrespective of whether the car is used for business purposes or for pleasure.
4. Expenses incident to maintenance, including depreciation at the rate of 20 per cent per annum, if a passenger car is used wholly for business. Where the car is used more than 50 per cent for business and incidentally for pleasure, the expense may be deducted on a prorata basis.
5. Loss sustained by reason of damage to a passenger automobile while being used for pleasure, if it is not compensated for by insurance or otherwise.
6. Paid damages for injury to a pedestrian, provided at the time the injury occurred the car was being used for business.
7. Loss when sustained where an automobile used for business purposes is traded in for a new car.
8. Amount paid for insurance on automobiles used for business purposes and also the amount of finance charges on a purchased car which covers interest and risk on the loan, but not the amount covering the premium on insurance to protect the finance company's interest.

Perfect Circle Announces Three-year Building Plan

HAGERSTOWN, IND., Feb. 12—Perfect Circle Co., manufacturer of piston rings, has announced that its new three-story warehouse, for which ground was broken here Feb. 7, is to be the first unit in a three-year building program. The new structure, 100 by 60 ft., will add 18,000 sq. ft. of floor space to the factory, and is to be used to hold a replacement ring stock of 8,000,000 units.

The Guepel Construction Co., of Indianapolis has the contract for the building which is to be completed within 60 days. Perfect Circle officials announce that within a period of six months to a year another unit will be added to the manufacturing division. Succeeding this within 12 to 18 months a third unit will be built.

Student Committee in S.A.E.

NEW YORK, Feb. 11—The Society of Automotive Engineers has decided to organize a committee to assist and foster engineering student activities.

Steel Mills Avoid Shipment Promises

Business Turned Away as Demand for Sheets and Strips Mounts

NEW YORK, Feb. 14—The leading interest's unfilled tonnage statement, showing orders to the extent of 4,101,487 tons on the books of its subsidiaries on Jan. 31, an increase of 132,775 tons over the preceding month's record and the heaviest backlog since March 31, 1928, furnishes a fair picture of conditions in the steel market as a whole. That part of it which serves automotive consumption is known to have added so heavily to its unfilled orders within the last four or five weeks that some mills are trying to sidestep all definite promises for shipment before May 1.

This bulge in automotive demand, especially noticeable in full-finished automobile sheets and strip-steel, has more than offset the slack inquiry for steel from many other consuming lines, leaving gains that, were it not for automotive demand, would be more than negatived. There is considerable talk in the steel market about the unevenness of the distribution of automotive orders. Aside from the fact that some motor car manufacturers and parts makers are at times more active as buyers than are others, this or that finishing mill getting a much larger slice of business is being pointed to as an odd condition in a market in which some sellers are actually turning business away.

One frequently hears the phrase "favorite sources of supply" by way of explanation. This favoritism, however, is predicated on very substantial reasons. Quality, especially in full-finished sheets, is perhaps even a more important factor than price. Once the product of a finishing mill has been found to run relatively high in prime stock, it is only natural that the buyer does not care to experiment elsewhere. In spite of the sold-out condition of some and the rush for early shipments, some of the large buyers are reported to be doing quite a bit of shopping, apparently willing to anticipate their spring requirements more freely if they can hold down price by doing so.

Pig Iron—Shipments into automotive consumption continue at a very fair rate, and inquiries for second quarter shipments are on the uptrend. Prices remain unchanged with the Michigan quotation $20.

Aluminum—Automotive demand for foundry metal is reported as continuing good. Application of the Aluminum Co. of Canada for upward revision of the Dominion tariff on aluminum and aluminum products is a matter that can in nowise affect the American market, its sole aim being to promote the consumption of aluminum of Canadian origin in Canada.

Copper—With the market firmly established at 18 cents, it is thought that producers will strive to their utmost to hold the price of the red metal at that level. Copper and brass products have been advanced in keeping with the higher cost of the unworked metal. The leading copper and brass manufacturing interest advanced copper products ⅝ cent, brass products ½ cent and bare copper wire ¼ cent.

Tin—Tin prices continue to seesaw from day to day, but the undertone of the market seems to be somewhat stronger. Energetic propaganda is being carried on in London to bring about regulation of production with a view to lifting prices to higher levels.

Lead—Fearing further advances a good many consumers, among them storage battery manufacturers, have come into the market, which continues strong.

Zinc—Paucity in the ore supply furnishes the basis for rather firm views on the part of producers.

Air Route to Join Italy and Brazil

WASHINGTON, Feb. 12—Plans for the establishment of an air service between Italy and Brazil have been completed, it was announced this week by the Department of Commerce. Small seaplanes will be used as far as Cape Verde Islands and a super-seaplane, equipped with two "Asso" engines of 1000 hp., to Pernambuco, according to the department. It is planned to use small planes from Pernambuco to Rio de Janeiro and Buenos Aires, the announcement states.

Stutz Schedules Record Output for Early Months

INDIANAPOLIS, Feb. 13—Production plans of the Stutz Motor Car Co. of America, Inc., for the early months of 1929 call for the greatest output of cars in the entire history of the company, according to E. S. Gorrell, president of the company.

February will be the largest production month Stutz has ever had with the exception of May, 1926. Production in March, however, will be greater than any month in the 18 years that Stutz has been producing quality automobiles. April and May plans call for an output increase over March.

Latvia Plans Small Car

WASHINGTON, Feb. 14—The Latvian Post and Telegraph Administration of Latvia have moved in the factory occupied by the former General Russian Electric Company in Riga, and plans to start production of passenger cars and trucks in the near future, according to a dispatch received this week by the Department of Commerce. The cars will be built to compete with foreign makes and will cost approximately $579, says the department.

Budd to Have Chain of Repair Stations

Body Servicing Project to Include Shops in All Large Cities

PHILADELPHIA, Feb. 12—Establishment of a nation-wide chain of Budd body service stations has been inaugurated by the Edward G. Budd Mfg. Co. of Philadelphia and Detroit, for the purpose of expanding the facilities for repair work on the 6,000,000 Budd bodies which are now owned and operated throughout the United States, according to officials at the factory here.

The plan contemplates the immediate authorization of one fully equipped station in each large city and further expansion as the demand for this service increases. Requirements for the stations are to be such that owners of Budd bodies will be assured of satisfactory service, although Budd officials are not insisting that operators be put to any unnecessary expense for equipment in order to obtain their franchise.

A definite program for aiding station operators in repair problems also has been formulated at Budd headquarters. Such work virtually necessitates modern welding equipment and the employment of a staff of sheet metal workers.

Trucks Assist Farmers in Meeting Competition

WASHINGTON, Feb. 14—The motor truck is enabling Eastern farmers to meet the competition from distant producing areas in the sale of fruits and vegetables in large consuming markets, according to Wells A. Sherman, of the Bureau of Agricultural Economics.

The development of refrigeration has made it possible for distant producers to send their products to the markets over long line hauls and thereby compete with nearby farmers, Sherman said. Highway improvement and motor truck transportation are helping Eastern farmers to meet this competition, he said.

Cook Spring Co. Sold

DETROIT, Feb. 11—The Cook Spring Co. of Ann Arbor, incorporated in 1924 with a capital of $100,000, has been purchased by Barnes-Gibson-Raymond, Inc., of Detroit, according to A. J. Donally, president. The company manufactures springs and other parts for Detroit automobile factories. Details of the sale have not been made public.

Berry Brothers Expanding

DETROIT, Feb. 12—Berry Brothers Corp. is building a new factory unit for the production of airplane finishes to meet the increasing demand for its products in the airplane industry. The plant will be completed some time in the spring.

Automobile Output Strong in Canada

Figures Show One Car Made Available for Every 46 Persons

OTTAWA, ONT., Feb. 12—Production of motor vehicles in Canada during 1928 reached a new record of 242,382 cars having a sales value, f.o.b. plant, of $151,826,338. This output was 18 per cent greater in number and 24 per cent higher in value than in 1926, the next best year, when 204,727 cars valued at $122,629,537 were made. In 1927 production totaled 178,427 vehicles valued at $115,904,228.

Compared with data for the previous year, figures for 1928 show that the number of cars made available for use in Canada was the highest on record, and that the number of cars imported and the number exported also reached new high levels.

Imports Total 47,408

Imports for the year totaled 47,408 cars, an increase of 29 per cent over the corresponding figure of 36,630 cars in 1927, and exports numbered 79,855 cars or 38 per cent more than the total of 57,852 cars shipped in the previous year. The apparent consumption of motor cars in Canada was 210,035 as determined by adding the Canadian production of 242,382 cars to the 47,408 cars imported and deducting the 79,855 cars exported. Corresponding figures for other years were 157,832 cars in 1927 and 158,577 cars for 1926.

In May a new monthly production record was established at 33,942 cars while in June at 28,399 and in August at 31,245 the output exceeded the previous record established in May, 1927, at 25,708 cars. Imports of motor cars numbered 1586 in January, climbed to a peak of 8126 in May and closed at 1200 in December. Exports totaled 3526 in January, worked irregularly upwards to a peak of 11,048 in August and closed at 6688 in December.

Decline in Trucks

Compared with the previous year, Canadian production in 1928 showed a higher output for all types of cars, and trucks also experienced an increase from 32,245 to 45,645. Open passenger cars rose to 40,673 from 37,585, closed model passenger cars advanced to 134,402 from 99,694 and chassis to 60,795 from 12,161, while 44 taxicabs or buses were made as compared with 11 in the previous year.

Estimating the population of Canada at 9,658,000 in 1928, Canadian automobile manufacturers last year made one new car for every 40 persons in the Dominion. In 1927, production averaged one car to 53 persons; in 1926, one car to 46, and in 1925, the ratio was one car to 57 persons. Considering imports and exports, one car to every 46 persons was made available for consumption.

Italy Is Admitting Chassis Duty Free

WASHINGTON, Feb. 11—Automobile chassis with engines, to be equipped with bodies and re-exported within six months, may be imported into Italy free of duty under the "temporary free admission" regime, according to the Department of Commerce. The regime, which is valid until Sept. 30, 1929, prescribes that cylinders have a capacity of not less than 4.50 liters.

Freight Handling Aired at Hearings

WASHINGTON, Feb. 14—Economies in freight handling from motor trucks to freight cars were stressed here last week during early hearings in connection with the investigation of the Interstate Commerce Commission into container freight service conducted by various railroads.

Attorney Examiner H. C. Ames of the commission announced this week that further hearings will be held at Dallas, Tex., on March 18, at Kansas City on March 28, and at New York on April 4. The commission proposes, he said, to make a broad inquiry into the rates, charges, rules, practices and regulations incident to the container service and also go into the matters of ownership, service and contractural arrangements affecting charges or revenues.

Less time is taken in loading and unloading the trucks so that trucks can be kept moving steadily, G. C. Woodruff, assistant freight traffic manager of the New York Central Railroad, told the commission. Car space can be conserved by using containers with resultant economies to the carriers, he said.

J. S. Marvin, of the National Automobile Chamber of Commerce, F. L. Horner, General Motors; J. W. Peters, Traffic Manager, Delco company and W. J. Enright of Chrysler Motors, attended the hearings at Washington last week.

Minneapolis Show Succeeds

MINNEAPOLIS, Feb. 12—The Twin City Automobile Show, held here last week, had an attendance of 86,202 for the seven days, announced as the largest to date. More than 400 automobiles were sold among the 33 makes which were exhibited in 300 models. In view of the success of the event this year, it will continue to be held in the livestock pavilion, State Fair Grounds, the management from both cities has agreed. Cal Sivright managed the show in cooperation with C. P. Joy, L. W. Lawrence and H. E. Warren, of St. Paul, and D. A. Odell, H. E. Pence and H. L. Shaefer, of Minneapolis.

Employment Varies Most in Car Field

Unstable Condition Revealed in Government Survey of Six Years

WASHINGTON, Feb. 14—Instability of employment is reported to be more marked in the automobile industry than in other industries, according to a statement issued here this week by the United States Department of Labor on the basis of a survey of 78 plants engaged in the manufacture of automobiles, trucks, buses, bodies or some substantial part of an automobile. Accessories and specialties were omitted from the survey.

"The automobile industry shows the greatest instability of employment of any of the industries so far analyzed by the bureau," the report stated. "Not only does the industry as a whole make a very bad showing, but irregularity and uncertainty of employment conditions are the rule among practically all the establishments covered."

"The annual averages show consistently bad stability conditions with little or no improvement apparent. In fact with the exception of 1926 each year showed a lower average than 1923. The industry as a whole did not vary much from year to year, but the individual establishments fluctuated widely and inconsistently with one another," said the report in discussing figures for the six-year period ending with November, 1928.

Addition to Hutto Plant Is Soon to be Completed

DETROIT, Feb. 13—Hutto Engineering Co. announces its new addition will be completed early in March. The new wing, which will practically double production facilities, is being made to take care of the rapid increase in the Hutto industrial business.

A large portion of the first floor will be devoted to manufacturing cylinder grinding machines such as recently have been furnished by Hutto to the Government for grinding large gun bores, and to several railroads for resizing locomotive cylinders. The second floor will be devoted to the manufacture of smaller grinders, such as the Model A and AT which are used extensively in the service field, and space formerly used for these products will be utilized for developing cylinder grinding machines used by automobile manufacturers. Provision is also being made for the expansion of the stone and assembly departments.

Oil Filter Announced

FLINT, MICH., Feb. 11—An oil filter for Ford cars and trucks is announced by the AC Spark Plug Co. The product, which is of the same construction as other AC filters, requires renewal of the filtering unit every 7000 miles, instead of 10,000.

Plymouth Operating in Its New Factory

DETROIT, Feb. 12—The Plymouth division of Chrysler Motors is now established in its new plant here which comprises 797,207 sq. ft. of floor space. The main structure runs three-fourths of a mile under one roof. This is the largest single-floor manufacturing structure in Michigan, according to J. E. Fields, vice-president in charge of sales of all Chrysler divisions.

A. vanDerZee, whose appointment as general sales manager of Plymouth, was made known several weeks ago, has established his offices in the new Plymouth executive offices which are in the new plant. Mr. vanDerZee, it is announced, will have a complete factory and field organization, made up of men promoted from other Chrysler Motors units. His assistant is J. W. Hutchins, formerly director of districts for Dodge Brothers.

George Frank Lord, who has been director of market development for Chrysler and Dodge Brothers, takes that place with Plymouth. Kenneth G. Pound, who formerly handled distribution at Chrysler, becomes director of distribution of Plymouth. M. E. Heath goes from the service department of Chrysler to become Plymouth's director of service.

Production in the new factory is already running on a schedule calling for a monthly volume twice as great as any previous single month's output at Plymouth's Highland Park factory.

Baltimore Firm to Build $250,000 Airplane Plant

BALTIMORE, Feb. 9—A plant for the manufacture of a three-passenger commercial monoplane and a small low-priced all-metal monoplane will be established in Baltimore soon by the Berliner-Joyce Aircraft Corp., which has been incorporated with authorized capital of $1,000,000, of which $700,000 has been subscribed. The company has purchased a site adjoining that of the proposed municipal airport and is to begin construction immediately at a cost of about $250,000. Considerable other work will be undertaken also, it has been announced.

W. M. Moss, former vice-president and comptroller of the Curtiss Aeroplane & Motor Co., is president. Henry Berliner, owner of the Berliner Aircraft Co., Alexandria, Va., is vice-president in charge of production, and Temple N. Joyce, formerly with the Curtiss company and later with the Chance-Vought Corp., is vice-president in charge of sales.

Coming Feature Issue of Chilton Class Journal Publications

Feb. 23—Statistical Issue Automotive Industries.

Murray Corp. Constructing New Body Parts Factory

DETROIT, Feb. 12—A contract for the construction of a $2,000,000 mill at Memphis, Tenn., to be used for turning out wooden parts for automobile bodies for the Murray Corp. of America, has been awarded to the Rock City Construction Co., Nashville, according to A. P. Dowell, vice-president of the corporation.

The plant, will turn out parts for 2500 bodies daily, Mr. Dowell said. He also announced that W. H. Greenwalt, manager of the Bay City plant, will be manager of the Memphis plant, dividing his duties between Detroit and Memphis, according to present plans of the company.

Plan Metals Conference

LONDON, Feb. 9—The Institute of Metals (Great Britain) will hold its annual general meeting at the headquarters of the Institution of Mechanical Engineers, March 13 and 14. Four technical sessions will be held and fifteen papers on subjects related to nonferrous metallurgy will be presented. At the same time the Institute will celebrate its "coming of age" by a "conversazione" and metallurgical exhibition, which will take place at the new Science Museum, South Kensington, London.

Lincoln Building to be Ready June 1

CINCINNATI, Feb. 12—Negotiations for purchase of a plot of ground 135 ft. by 260 ft. and the erection of a three-story fireproof building have been completed by the 16 Ford-Lincoln dealers in Cincinnati, and with completion of the building, scheduled for June 1, all sales and service of Lincoln cars will be handled there.

The dealers have incorporated as the Authorized Distributors Inc., with C. H. Petermann, of the Universal Car Co., president; George H. Sickles, of the Bauer Auto Sales Co., vice-president, and H. J. Berning, of Hilary J. Berning, secretary.

When the new building is completed local Ford dealers will confine activities in their present locations to Ford sales and service, operations in connection with Lincoln being handled by the new company. Ground and building will involve an expenditure of $125,000, with machinery, equipment and fixtures to cost approximately $50,000.

Oakland Makes Changes in Factory Executives

DETROIT, Feb. 12—Several changes in personnel of the Oakland Motor Car Co. have been announced by Gordon LeFevbre, vice-president. W. H. Eddy, formerly chief inspector, has become general superintendent, succeeding R. B. Smith, who has been assigned to manufacturing problems. Vern E. Walters has been made master mechanic, succeeding W. H. Vann.

Mr. Vann has been made chief inspector. During Mr. Vann's absence because of illness L. C. Kelsey has been acting chief inspector. L. A. Blackburn has been appointed superintendent of all non-productive departments and S. B. Withington has been made supervisor of paint.

London-India Route Fixed

LONDON, Feb. 11—Imperial Airways, the subsidized British air transport company, announces that its direct air service between London and India will be inaugurated March 30 with a weekly service in both directions. The entire route, about 5000 miles, will be covered in approximately six days and four hours, it is explained.

Calendar of Coming Events

SHOWS

All-American Aircraft Show, Detroit Board of Commerce, Detroit..Apr. 6-14
Automobile Salon, Inc., Palace Hotel, San Francisco .....Feb. 23-Mar. 2
Boston, Mass., Mechanics Bldg..March 2-9
Geneva Automobile Show.....Mar. 15-24
Leipzig, Germany, Fair.....Mar. 3-13
Melbourne Automobile Show.....May 2-11
International Aircraft Exhibition, Olympia, London .....July 16-27

CONVENTIONS

Marketing Executives Conference, Hotel Gibson, Cincinnati .....April 3-5
Annual Meeting National Foreign Trade Council, Baltimore....April 17-19
American Society of Mechanical Engineers, Detroit .....May 1-3
American Management Association, New York .....May 7-9
National Highway Traffic Association, Hotel Stevens, Chicago.....May 13-15

RACES

Daytona, Fla. ... .Mar. 1-15
Akron .....May 12
Gardner Trophy (Aircraft), St. Louis, May 28-30
Indianapolis .....May 30
Detroit .....June 9
Altoona, Pa.....June 15
Salem, N. H.....June 29
French Grand Prix, Le Mans.....June 30
Akron .....Aug. 18
Syracuse .....Aug. 31
Altoona, Pa.....Sept. 2
Cleveland .....Sept. 15
Salem, N. H.....Oct. 12

S. A. E.

Sectional

Pennsylvania, Philadelphia .....Feb. 19
Buffalo, Hotel Statler ..... " 19
Dayton ..... " 19
Detroit, Book-Cadillac (Aeronautics) " 25
Washington, City Club (Aviation).. " 27